COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices

© 1979 by CW Communications/Inc.

Vol. XIII, No. 21 May 21, 1979 $1.00 a copy; $25/year

NEWSPAPER

DP Crime Legislation: A State-by-State Scorecard

More than 130 pieces of privacy and security legislation have been introduced in state legislatures since Jan. 1, the Computer and Business Equipment Manufacturers Association has reported.

The bulk of the legislation falls into three categories: criminal records, credit reporting and computer crime.

"The area of computer crime is receiving greater attention in light of the amount of media coverage being given one or two large, but not totally relevant, cases," the Washington-based association said in its state legislation status report for 1979.

Here is a state-by-state rundown of the 15 pieces of computer crime legislation introduced so far this year:

State	Bill Number	Definition of Bill
California	S. 66	Prohibits direct or indirect use of a computer, computer system or network for criminal purposes.
Hawaii	S. 504	Prohibits use of computers for criminal purposes.
Illinois	H. 1027	Makes it illegal to alter computer programs without consent of owner.
Maryland	H. 497	Prohibits fraud by use of a computer and establishes penalties.
Maryland	S. 908	Prohibits fraud by use of a computer.
Massachusetts	H. 4782	Relates to establishing a computer privacy law.
Michigan	S. 848	Prohibits computer fraud.
Missouri	S. 230	Relates to computers, systems, networks, equipment and supplies with penalty provisions.
New Mexico	S. 8	Makes misuse of computers a crime.
North Carolina	S. 397	Makes computer-related crime a felony.
Tennessee	H. 114	Makes unauthorized use of computer equipment a criminal offense.
Tennessee	H. 506	Permits state employees to have access to personal files.
Tennessee	S. 172	Same as H. 114.
Tennessee	S. 514	Same as H. 506.
Utah	H. 183	Prohibits computer fraud.

Specialized Processors Brought Out by NCSS

By E. Drake Lundell Jr.
CW Staff

NORWALK, Conn. — Increased functionality and distributed processing capabilities mark today's introduction of two specialized processors by National CSS, Inc. (NCSS) here.

The units — a remote communications-oriented processor and a back-end processor for specialized functions — join the firm's line of 32-bit minicomputers, the 3200 series, which are software-compatible with IBM 360, 370 and Series 30 machines.

NCSS also announced plans to offer by the end of the year an upgrade of its present 3200 III processor, which has the power of an IBM 370/138, to a 3200 V unit with the power of an IBM 370/148. However, it did not release details or prices.

The two latest units are called the 3200/Remote and the 3200/Server and were designed to operate with a 3200/Host processor or any IBM software-compatible machine that uses VPS, the NCSS proprietary operating system.

The two systems are basically the same processor as the 3200/Host, manufactured for NCSS by Two Pi Corp. [CW, April 17, 1978]. However, both the hardware and software have been modified for the system's specialized tasks.

This tailoring permits NCSS to offer the systems at about half the price of a 3200/Host system, according to James S. McGuire, president of the firm's Computer Division. With the specialized systems, "the user can pick various combinations of NCSS 3200/Host, applications-oriented and communications-oriented processors to configure a system that matches his particular needs," he said. Both of the new units work under the control of a host processor running under VPS, which has been modified for the specific applications running on each processor. The full VPS runs on the host, a communications-oriented version

(Continued on Page 8)

Sigma Users Get Upgrade Option Based on CP-6

WALTHAM, Mass. — Homing in on the Xerox CP-V user base, Honeywell, Inc. has announced a second CP-6-driven large-scale computer designed as an upgrade for Sigma 6, 7 and 560 series systems.

Honeywell's Series 60 Level 66/-DPS/B3 fills a gap in the CP-V mid-performance range to provide a growth path for this largest group of CP-V users, a Honeywell spokesman said.

A year ago, the firm announced its first Xerox-related hardware, the DPS/C system, targeted as a replacement for the high-end user.

While technologically similar to the DPS/C, the DPS/B3 handles 40 to 120 fewer users than its predecessor. A typical 80-user DPS/B3 — consisting of a central processor with associated storage, front-end processor, 600M bytes of disk storage, two tape drives, one card reader and one line printer — costs about $840,000.

The system was designed to run under Honeywell's CP-6 operating system. Currently under development in Los Angeles, a CP-6 general release will be offered in December, while a limited number of control releases will be available beginning in June.

First shipments of the Level 66/-DPS/B3 are scheduled for the first quarter of 1980.

Colo. Crime Bill Expected to Pass

By John Whitmarsh
CW Staff

DENVER — Colorado will become the latest state to crack down on computer fraud, if a computer crime bill is enacted this week as expected.

Passage of H.B. 1110 — and its all-but-certain signing by Gov. Richard D. Lamm — will add Colorado to the small but growing list of states that have passed such legislation.

Florida and Arizona passed the first computer crime laws last year, and 15 pieces of computer crime legislation have been introduced in state houses around the country since Jan. 1 (see box).

The Colorado bill would allow the state to prosecute any person who knowingly uses a computer for fraudulent purposes. The bill would outlaw assault or malicious destruction of a computer and would also punish any unauthorized use or alteration of a computer, its software or data.

If enacted and signed, the bill will take effect July 1. Individuals convicted under the law would face penalties in proportion to the value of the item stolen, a unique feature of the Colorado bill.

Under the measure, computer theft up to $200 constitutes a misdemeanor, punishable by a fine and a jail sentence

(Continued on Page 4)

U.S. vs. AT&T May Start Later

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — The Justice Department's efforts to go to trial as soon as possible in the antitrust case against AT&T may have lost ground last week.

Federal Judge Harold H. Greene expressed some dissatisfaction with a U.S. proposal to begin trial Nov. 1 on "background" aspects of the case, now

(Continued on Page 6)

Too Many Chefs . . .

By Marcy Rosenberg
CW Staff

NEW YORK — To cook up the right mix of communications, word processing and computers for the office of the future, companies can't depend on too many chefs.

When business organizations turn to individual departments rather than to centralized corporate decisions to coordinate and implement these technologies, the office automation recipe can turn into a witch's brew.

To keep the menu palatable, firms should "take a corporate overview to improve the flow of information," according to Victor Krasan, manager of office-of-the-future practices at Peat, Marwick, Mitchell & Co., a management consulting firm here.

Individual user departments "have their own vested interests and are not that concerned about where information goes and how it gets there," he maintained.

(Continued on Page 8)

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Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

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POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, MA. 02160. ac

To Make Gear for Other Vendors?

IBM Peripherals Division Predicted

By Jeffry Beeler
CW West Coast Bureau

MARINA DEL REY, Calif. — IBM will form a separate division for its peripherals business, much as it has already created distinct divisions for its large- and small-scale systems, according to John Imlay, chairman of Management Science America, Inc. (MSA).

Moreover, the forthcoming peripherals division will supply equipment that will attach not just to IBM's own CPUs, but to other vendor's mainframes as well, predicted Imlay, who also serves as president of the Association of Data Processing Service Organizations (Adapso).

Speaking at MSA's recent Management '79 conference here, Imlay outlined some of the major trends and developments he sees sweeping the computer industry during the next 10 years.

Here are some highlights of Imlay's other predictions:

- IBM's peripherals division will gross $4 billion to $5 billion almost as soon as it is formed.
- IBM's General Systems and Office Products Divisions will merge during the next few years as the industry giant jockeys for dominance in the office-of-the-future market.
- Software will become an increasingly important sector of IBM's business and could account for 50% of its revenues by 1990.
- IBM will reenter the service business as its Satellite Business Systems (SBS) operation gets literally and figuratively off the ground.
- Just as Ford Motor Co. has formed its own bank to help customers finance the purchase of automobiles, so will IBM establish a bank to finance the acquisition of software and communications facilities beyond the mid-1980s.

Echoing the dire warnings of IBM Chairman Frank Cary, Imlay also forecast increasing penetration in the U.S. computer market by Japanese hardware vendors. "The productivity of Japanese firms is five times greater than our own, and their computer manufacturers have the full financial backing of their government," the MSA chief noted.

To forestall the expected competition, IBM recently "leapfrogged" the Japanese through dramatic price/performance improvments in its 4300 series, he added.

In other observations, Imlay predicted a twofold reduction in data communications costs during the near future and the eventual emergence of communications managers who will operate on an equal footing with today's DP managers. Factors that will force communications costs downward include the implementation of SBS and the seemingly inevitable IBM vs. AT&T confrontation, which the Adapso president likened to "King Kong vs. Godzilla."

Imlay also predicted a "tremendous" growth in the U.S. software industry, although developments in that sector will continue to advance more slowly than hardware technology.

The applications software market, which totaled $365 million in 1977, will grow 30% annually through 1982, when it will top $1.3 billion, Imlay said.

The annual revenues of 14 applications software suppliers already exceed $10 million, and many participants in the field have begun to prosper again after a long depression during which some competitors fell by the wayside.

Turning his attention to the personal computing sector, Imlay saw a "major battle" between hardware vendors for leadership in the "electronic home" market.

"The average person today has a fear of putting a computer in the home, but all that will change," he said. "Today's generation of kids will use personal computers the same way members of my generation used slide rules."

Education and entertainment will represent the two most important applications for home computers, Imlay said.

Blame Denied In A-Plant Affair

SAN FRANCISCO — The holding company for EDS Nuclear, Inc., a vendor of software used in the design of nuclear power plants, has denied a *Computerworld* report that EDS Nuclear provided software possibly responsible for the Three Mile Island nuclear accident.

Contradicting a statement from an EDS Nuclear technician [CW, April 9], Robert J. Feibusch, president of San Francisco-based Impell Corp., said EDS Nuclear software did not support "systems or events which possibly were responsible for the Three Mile Island . . . incident."

Feibusch also denied that his firm might face litigation in the matter. The technician had said the firm was preparing for possible court action.

On the Inside This Week

NEWS
Space Defense Center Keeps Eye on Heavens 4
Skylab's Future Landing Site Defying Prediction 5
Full Appeals Court to Hear Case for SBS License . . . 6
Airlines' DPers Busy in Wake of United Strike 7
Printouts Focus of Betting, Arson Investigation 9
Olympics: Reservation System's Herculean Task . . 10
Tarkenton Chides Manager's Lack of Feedback . . . 11
Office of Future May Not Work, Poppel Warns. 12
No Tax on Application Software in Rhode Island . . . 14
DPMA Takes Stand Against DPer Standards. 15
Progress of Micro Seen As Realization of Dream. . . 16
After a 15-Month Hassle, City Gets System Up 17
CAT Scan Locates Scroll Under Mummy's Arm. . . . 18
DP Gear Found Slowing Office Productivity. 19
Computer Scientists Seen Losing Sight of Goal. . . . 22
Scientist Creates Color That Can't Be Copied 23
Kinn Now Afips Executive Director 24
Professional Development Seminars Set at NCC. . . 25

EDITORIAL
Editorial: Moving Up 26
Taylor Report: TRS-80 Takes Big Strides 27
Human Connection: Employee Development 27
IBM Trial: Justice's Vietnam? 27
The Hexadecimal Kid and His Faithful Dog Ascii . . . 27

SOFTWARE & SERVICES
Documentation Study Proves Utility of Listings 33
WP Maker Edits Inventory With Package's Help . . . 34
Mini, Micro 'Polyforth' Cuts Developer Time 36
WP System for PDP-11 Updated 37
Illinois Banks Get Alternative to In-House DP. 38
On-Line System Sharpens Firm's Forecasts 39

COMMUNICATIONS
Great Growth in Local Networks Cited 41
Two Electronic Registers Added to NCR Line 43
Converter Handles Ascii For Honeywell GRTS. 44
Software From Tandem Gives X.25 Support 45
Modem Stand-In, Switch Announced by Gandalf . . 47

SYSTEMS & PERIPHERALS
Denver's License Renewal OCR at Work 49
System Allows for 'Human' Side of Business 50
System Protects DP Sites 52
Main Goal of Itel Users Group: Idea Exchange. 53
City Upgrades Despite Proposition 13 Limits. 54

MINIWORLD
Mini Cassettes, Cartridges Explored 59
Perkin-Elmer CPUs Get High-Density Tape. 60
Mini Traces Canned Goods Pouring Into Firm. 62
Cartridge Drive Operates at 1,600 Bit/In 63
A/D Data Acquisition Unit Offers 250 KHz Speed . . 64

MICROCOMPUTING
Radio Shack TRS-80 Gets Accessories 65
Micro Based on 8085 Puts Focus on Application. . . 66

COMPUTER INDUSTRY
Graphics Market Seen Finally Ripening 67
NCR Deals Severe Blow to Adds. 67
PCC, Univac Sign Pact 68
Vendors See Technology Curbing Graphics Mart . . 69
Calcomp Agrees in Principle to Sanders Merger. . . 71
Trade Groups Fear FCC Control of DP Industry. . . . 72

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Space Defense Center Keeps Eye on Heavens

By A CW Staff Writer

COLORADO SPRINGS, Colo. — Tucked deep within the nearby Cheyenne mountains, the North American Air Defense Command's (Norad) Space Defense Center keeps a computer-aided eye on the satellites and debris orbiting the Earth. But that is only part of the story.

In the Federal Building here, the Aerospace Defense Command complex provides a more permanent record of the approximately 4,500 pieces of man-made material floating just beyond the Earth's atmosphere. The Historical Data System (KDS) was established late last year and supplies a history of satellites on hard copy, microfilm, microfiche, punched cards or magnetic tape.

Described as the most complete repository of satellite data, the HDS has information dating back to the days of the Soviets' Sputnik launch. In fact, any space-related activity that occurred within the past three years is available on-line from the agency's continually updated data base.

HDS was formed primarily to relieve Norad of the burden of having to catalog and store the astronomical quantities of data associated with space materials tracking. Using its Philco computers, Norad would transfer historical data to magnetic tape — a process that resulted in a library of more than 2,000 reels of tape subject to accidental erasure and oxide deterioration.

Presently, HDS is responsible for storing satellite-related data. The agency has a Digital Equipment Corp. PDP-11/70 processor with 128K bytes of memory, six Bunker Ramo Corp. disk drives and an Information International, Inc. Comp 80/2 computer output microfilm unit.

Because some of the historical agency's data is classified, every request for information must be cleared through security before statistics are released, a spokesman noted. In fact, requests from Norad analysts and scientists account for 90% of the HDS' business. The remaining 10% of the data is given out to the National Aeronautics and Space Command and academic institutions such as MIT.

"We provide the data, just raw data, and then it's up to these people to manipulate it any way they want," the HDS spokesman said.

Colorado DP Crime Bill Expected to Pass

(Continued from Page 1)

up to 12 months; theft over $200 is a felony, punishable by a fine and a jail sentence from one day to 40 years.

New Tool for Prosecutors

Introduced by Rep. Cliff Dodge (R-Denver), H.B. 1110 amounts to the Colorado equivalent of S. 240, the federal computer crime bill sponsored by Sen. Abraham Ribicoff (D-Conn.) and currently undergoing debate in the U.S. Senate.

The Colorado bill won final approval in the State House of Representatives by a 31-0 vote on Feb. 19 and passed the state Senate on April 27 by a 63-0 vote. The bill had the support of the Denver computer community.

The Colorado bill was designed to give state prosecutors a new tool to deal with rising computer crime.

"We have an explosion of computers in Denver, and we are beginning to see more computer crime," Denver District Attorney Dale Tooley said, adding that present theft statutes are inadequate for the successful prosecution of computer crime.

"Horse-and-buggy definitions in the theft statutes" and a recent state Supreme Court ruling on confidential information have hindered attempts to convict — and even charge — computer offenders, agreed Andrew Vogt, executive director of the Colorado District Attorneys Council.

In one week, the Denver district attorney's office received three complaints of computer crime, two of which could not be filed "because the statutes were not good enough," Tooley said.

In one case, credit information stored on magnetic tape had been erased to conceal a person's bankruptcy status. "But that offender didn't *take* anything. All he did was erase a computer tape," Tooley said. "Under our present law, that was not a taking because our state Supreme Court recently ruled that confidential information is not a thing of value.

"This new computer crime bill clears that up. We have expanded the definition of 'a thing of value' to include confidential information," Tooley said.

Different From Florida's

Although modeled after the Florida computer crime law, the Colorado bill differs in two respects.

First, the Colorado version relates the penalty for the offense to the value of the item taken.

Under the present provisions of the bill, computer theft under $50 constitutes a Class III misdemeanor, punishable by a fine of $50 to $750 and up to six months in jail. A theft over $50 but under $200 is a Class II misdemeanor, calling for a fine of $250 to $1,000 and a jail sentence of three to 12 months.

A theft between $200 and $10,000 is a Class IV felony, with a fine of $2,000 to $30,000 and a jail sentence of one day to 10 years. Theft of more than $10,000 is a Class III felony calling for no fine but a jail sentence of five to 40 years.

Colorado is now revising its felony classification system. Effective July 1, the Class III and Class IV categories will carry sentences that more accurately reflect the actual time to be served.

The revised Class IV felony will call for two to four years in jail plus one year of parole, but no fine; a revised Class III felony will call for four to eight years in jail plus one year of parole and no fine. In exceptional circumstances, the maximum jail sentence in Class III can be as high as eight years and in Class IV, 16 years.

The Colorado bill also strives for clearer definitions of computer terms than those that appear in the Florida and Arizona laws or the pending federal legislation.

"Our intent was not to broaden or narrow the definitions of the Florida law, but to make them more accurate," Tooley said.

For example, the Colorado definition of computer network includes "microwave or other means of electronic communication," which the Florida law reportedly does not include. "The computer experts who studied our proposed legislation felt that microwaves were not adequately covered in the Florida law or even in the federal bill," Tooley said.

The Colorado bill includes nine definitions of computer terms, from "use" ("to instruct, communicate with, store data in, retrieve data from or otherwise make use of any resources of a computer, computer system or computer network") to "services" ("includes, but is not limited to, computer time, data processing and storage functions").

Why does computer crime merit such special legal attention?

"It's a definitional problem," Vogt suggested. "The court, in trying to apply the old statutes that worked for items like cars or jet airplanes, could not apply them to this new thing called information.

"Also, the computer itself has little inherent value. It is what the machinery can do that is of value and that means the manipulation of information. A section of magnetic tape is worth pennies, but the thing of value is the information on that tape."

The problems of definition and prosecution mean more such computer crime laws will be enacted, acording to Donn Parker, senior information management consultant at SRI International in Menlo Park, Calif.

"The problem is that attorneys have to use laws that were not intended for this kind of crime. Prosecutors want to convict people for the crimes they perpetrate," Parker said.

Recent cases demonstrate that computer criminals are convicted of practically anything except computer crime, Parker said. For example:

- Two computer criminals in Philadelphia stole $144,000 worth of computer time, but were convicted of mail fraud.
- A man who stole a copy of an operating system in Virginia was convicted of wire fraud.
- A group of maintenance engineers in Connecticut who were sabotaging their customer's computer over the telephone line with a tape cassette were convicted of making obscene telephone calls.

The purpose of the Colorado bill and others like it is "to merely update criminal law to keep pace with the advancements in technology," Parker said, adding that where most such bills fall down is in the tricky area of definitions.

"Computer crime is not your garden variety bar shooting," Tooley said. "It is a carefully planned white-collar crime where people think ahead to the possible consequences. The Colorado bill will have more of a realistic deterrent effect in this field than in most."

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Despite Use of Sophisticated Equipment

Skylab's Future Landing Site Defying Prediction

By Tim Scannell
CW Staff

WASHINGTON, D.C. — Although computers, radar and an army of space scientists continue to track Skylab as it tumbles toward Earth, there is practically no way of knowing exactly when or where the 85-ton satellite will hit, according to a National Aeronautics and Space Administration (Nasa) official here.

"From a practical standpoint, there will be no advanced notice," according to Richard G. Smith, a deputy associate administrator with the space agency. If Skylab happened to fall within the range of a radar tracking station "and you got a very good signal, you might be able to give a warning."

But "there's a good chance that it would be out of sight of a ground station the instant it started breaking up."

Launched a little more than six years ago, Skylab will enter the Earth's inner atmosphere sometime between June 20 and July 4, with a 50% chance that the reentry will occur on June 26, according to official estimates released by the North American Air Defense Command's (Norad) Space Defense Center in Colorado. The satellite will then break up, scattering more than 500 pieces weighing a total of 25 tons over 12% of the Earth's surface at speeds up to 300 ft/sec [CW, Feb. 5].

Spotted With Inaccuracies

Using a variety of radar tracking and computer simulation techniques, Norad has been trying to project where and when the satellite, as well as approximately 4,500 other pieces of space "junk," will fall from orbit and strike the ground. However, these space-age computer predictions and collision forecasts are spotted with uncontrollable inaccuracies, Smith stated.

Last month, for instance, Nasa and Norad mobilized all of their Skylab-oriented communications, computer and radar facilities to monitor a falling Soviet rocket stage used in the 1971 launching of the Cosmos 461 satellite. "Since we do have this contingency procedure set up, we wanted to involve all the people and all the communications links as if it were Skylab, to see if we would have any problems and if we had an effective communications channel," the space agency official noted.

Two hours before the staging hit, Norad's Philco 2000 computer predicted that the staging would land somewhere in the vicinity of Pitcairn Island in the South Pacific. However, the 10- to 18-foot Soviet rocket bounced as it hit the hard shell of the Earth's atmosphere, skipped about 4,000 miles and finally landed in the ocean somewhere northwest of Hawaii.

"There wasn't any danger to anybody, but that shows you the type of accuracy you're talking about," Smith pointed out.

Chance of Danger Small

Despite the multithousand-mile tracking error, Nasa and Norad labeled the "high-fidelity simulation" a success and stressed that there is one chance in 150 that somebody will be hurt or killed by a molten chunk of the falling space station. "That means you'd have to have 150 Skylabs come in before you had one [injury or death] occur," Smith said.

Currently, Norad is running weekly computer projections on the Skylab descent and will perform daily simulations when less than two weeks remain before the impact. The computer reports will then be posted 24, 12, six, four and finally two hours before the satellite hits.

However, with two hours to go, these projections still have an uncertainty of approximately 13,800 miles, a Nasa spokesman said. The rate and angle of Skylab's reentry continues to be susceptible to gravitational variations, unexpected solar flares, irregularities in atmospheric density and radar limitations.

Feverish Calculations

Meanwhile, Nasa and Norad computers are feverishly calculating the odds on the effectiveness of using Skylab's booster rockets to alter its angle of descent should the station start to break up over a populated area. In addition, a bureaucratic reentry disaster team consisting of representatives of the Federal Preparedness Agency, the departments of Defense, Justice and State as well as an assortment of state and local officials is braced for the satellite's inevitable return.

Although Nasa is not planning to have any emergency medical teams standing by in case of a satellite-related accident, "we would, if requested, dispatch people to assess any damage and to verify if, in fact, it was [caused by] Skylab," Smith continued.

Pointing out that a piece of space flotsam pierces the Earth's atmosphere every day, Nasa officials maintain that there is presently no definite threat to human life. Also, if an injury should occur, any local hospital would be able to handle it. "You're not talking about a rain of thousands of pieces," the deputy assistant administrator said, "but perhaps something of the magnitude of a major automobile accident."

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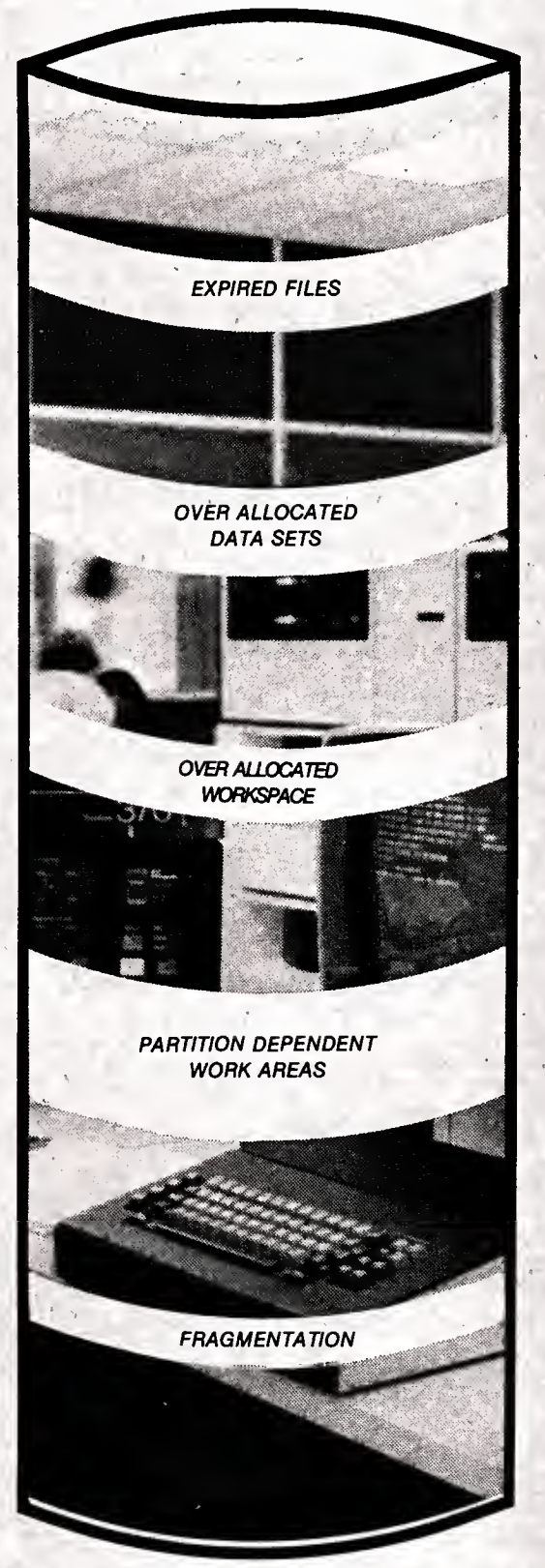

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Full Appeals Court to Hear SBS License Case

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — The Federal Communications Commission (FCC) and Satellite Business Systems (SBS) have won a full hearing before the U.S. Court of Appeals here on the right of the three-company consortium to enter the satellite business.

The nine-judge hearing panel will include the three judges who repealed SBS' license to go ahead with its planned domestic satellite communications services [CW, Sept. 11].

SBS, joint venture of IBM, Communications Satellite Corp. (Comsat) and Aetna Casualty & Surety Co., was designed to establish satellite linkage between large businesses and their far-flung subsidiaries.

The FCC had granted SBS its license without a hearing in January 1977 on the grounds that the integrated digital and voice communications venture was not anticompetitive. Even if the partnership were anticompetitive, the FCC held at the time, approval of the license would be in the public interest because SBS would provide excellent service and could compete with AT&T.

The FCC's 1977 decision was contested in a number of suits — eventually consolidated — brought by the Justice Department, Western Union Telegraph Co., American Satellite Corp. and Fairchild Industries, Inc.

The U.S. Court of Appeals, in its Aug. 29 decision, stated that the FCC was required by law to hold a hearing before it could make a judgment on SBS' anticompetitive impact on the industry. Both the FCC and SBS promptly appealed that ruling. After "unusually long" deliberation, the full court has granted a hearing to begin in the term that starts in September, the SBS spokesman said.

"We are naturally very pleased that the full Court of Appeals has agreed with us that the Aug. 29 decision by the three-judge panel should be reconsidered," SBS President Philip N. Whittaker stated.

As for SBS' original projected start-up date of January 1981, "that remains our schedule," the SBS spokesman said.

In other action, the FCC has indicated it will authorize SBS to construct two tracking, telemetry and command stations, in Colorado and in Maryland.

Next Year, Back to Manual Methods

Input Error Flummoxes Dorm Lottery

By Ann Dooley
CW Staff

ATLANTA — A suspected computer tamperer at the Georgia Institute of Technology here sent computer experts scurrying to discover how their supposedly secure system was penetrated — only to find that an input error had caused all the trouble.

The problem arose when Georgia Tech housing authorities initiated an automated lottery to eliminate the long lines students had to put up with while waiting to sign up for next year's dorm rooms.

The university's mainframe, a Control Data Corp. Cyber 70, was programmed to assign numbers at random from cards submitted by 1,750 men and 525 women students. Male students who received a lottery number less than 800 were almost assured of a dorm room; women students who received a number less than 265 would also probably be given dorm space.

But when the results of the lottery were posted on April 22, some students noticed that those applicants identified by Social Security numbers received numbers under the critical cutoff point and were thus assured of getting rooms, while those identified only by names lost out. One student determined the odds of such a coincidence occurring so consistently to be one in several trillion.

The students took their findings to the Georgia Tech housing authorities who, after determining that the correlation existed, began to investigate.

Every student's card appeared to have been manipulated, housing director Gary Schwarzmueller recalled. One obvious conclusion was that somebody had rigged the lottery.

No Programming Error

In order to rule out the possibility of malfeasance, the lottery program was immediately checked to determine whether an error had occurred. When no programming error was found, authorities theorized that someone had reassigned the lottery numbers after the original lottery program had been run and before the results had been output.

The key factor appeared to be a low seventh number in each student's Social Security number. If a student had failed to provide his number or had a high seventh number, he was assigned a high lottery number and rendered ineligible for dorm space next year.

Housing authorities assumed that the culprit had a very sophisticated knowledge of computers, since the system had a password that was changed weekly as well as other security checks. The Cyber system is used for billing, grades, bookkeeping and several other projects, but those are under even tighter security, according to Schwarzmueller.

Authorities thought the culprit might have rigged the lottery by using one of the two terminals located in the housing office or even by using another terminal to gain access to the interactive system. After investigating the daily log of all activity on the system, however, housing authorities realized that no one at all had gained unauthorized access to the system and that the foul-up had occurred as a result of the failure to press the CLEAR command. If the old program is never cleared, the new one is run against the same program and skews all the results, as happened in this case, systems analyst John Gilmore explained.

Second Lottery

A second lottery was run immediately, and the resulting room assignments proved to be completely random choices.

Many of the students who had been given high priority in the first lottery but not in the second were upset with the whole process. As a result, dorm assignments will be processed on a manual basis next year, with students once more standing in line to be awarded dorm rooms instead of waiting for a computer to decide their fates.

U.S. vs. AT&T May Be Late

(Continued from Page 1)

in its fourth year.

After hearing arguments by lawyers for both sides in a pretrial hearing May 11, Greene told lead U.S. attorney Kenneth C. Anderson that the government had failed to explain how it would distinguish "background" issues of the case from central, disputed issues.

The issues characterized by the U.S. as "background" include the structure of AT&T, the structure of the industry, the way the telephone system operates and the regulatory framework in which the telephone company operates, according to an attorney for the government.

The government views as essential "what we allege to be anticompetitive conduct by AT&T," the spokesman said. By calling issues "background" issues, the spokesman said, the government does not mean to imply that the points are unimportant, but rather "preliminary, setting-the-stage types of facts."

What the government considers as background, however, AT&T views as essential to its defense, since it illustrates the company's development and the reasons for its conduct.

AT&T feels, moreover, that the early trial date "would serve no useful purpose. No issues can be segregated and tried separately, which is what the government proposes," an AT&T attorney said.

According to the present schedule of legal procedures in the case, the trial would not begin until after April 1, 1980, when the discovery proceedings are slated to close, the AT&T attorney said. The judge has yet to rule on the proposal.

Also on May 11, Greene took under advisement whether he should instruct the parties to use the "stipulations" or the "admissions" method when they try to agree on uncontested facts before the trial.

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Absorbing Flow of Passengers

Airlines' DPers Busy in Wake of United Strike

By Jay Woodruff
CW Staff

DPers at the three airlines which have taken over the flow of passengers from United Airlines in the wake of that airline's strike on March 31 aren't complaining, but they are busy.

"We seem to have done very well," according to Barbara Amster, American Airlines director of yield management. Amster's job is to make maximum use of space on the airplane.

"As United goes forward and cancels another week of flights and sends its passenger list out to the other carriers, you get another influx of messages to handle," she said. As a result, weekends are usually very heavy when United unloads that week's reservations.

"There were some measures we took to handle peak days — what we considered 'threshold days,' which were about as much as our Amdahl Corp. 470V/7 could hold in the reservations system," she said.

Among those measures, according to an American Airlines spokesman, one was to hire "several hundred" furloughed United Airlines reservations people and place them in American's reservation centers to handle the high volume of calls. In addition, the airline's personnel are putting in overtime and overlapping their shift schedules to adjust for the extra passenger traffic.

Still, it has not been necessary for the company to add DP equipment to receive calls. "The problem is just how to get enough people here to answer all of them," the spokesman explained.

TWA Transactions Increase

Trans World Airlines (TWA), with 20% to 25% increases in passenger traffic, has hired about 300 reservations personnel from the stricken airline to handle the additional passenger load. "It's a basic rule among the airlines that if one is struck, we hire whom we can from it, both to help us out and to give them work in the meantime," a TWA representative said.

At TWA's central reservations center in Kansas City, Mo., the peak volume of transactions before the strike was 3.8 million a day. Since the strike, the company has hit a high of 5.1 million daily transactions.

This resulted from a seasonal upsurge of growth, the normal growth of the airline on a year-to-year basis and the effects of taking over between 20% and 25% of United's business, according to Jack Kennedy, TWA staff vice-president of computer systems and operations. This year — in April and May — the airline showed an overall growth over the same time last year of 45% to 55%.

The increased number of ticket documents passing through the system has forced the company to hire additional personnel and to work "a considerable amount of overtime on weekends," Kennedy said.

"We've not needed to make any adjustments except for dealing with the problems of data entry activity," he noted. The data entry shop is already handling about 4 million documents a month, and trying to cope with 25% more tickets being processed daily is "a pretty hefty increase for us," Kennedy admitted.

Reservations office workers are also putting in extra hours, as is the central reservations group in Kansas City. "Otherwise, we have been able to sustain that increased load because other than data entry, we have either on-line or batch-related systems, and we've had enough volume capacity in the systems to handle it," Kennedy said.

Busy Signals

Northwest Airlines, which competed directly with United for a large section of the Midwest's cities, revealed that "We've been giving out more busy signals than we'd like "when customers call up for reservations.

Compared with April and May of last year, Northwest this year has shown a 37% increase in traffic, which Northwest's Roy Erikson attributed to the United strike windfall, the fact that the Easter holiday came in April this year (instead of March) and the two-day strike last April at Northwest.

Erikson mentioned an additional problem that has compounded all of the airlines' reservations systems problems — the complex variety of fares that is now available to passengers. "It takes effectively twice as long to complete transactions," he said. "There used to be first-class, economy, night-coach and a family plan in days gone by.

"Now you've got Supersavers, Super Supersavers, "Peanuts Fares,' Freedom Fares, Two-for-One Fares, excursion fares with 30 days advance reservations — you name it; the airline industry's got it," he said.

"When a customer asks, 'What's the lowest fare?' the reservations person has to ask a whole lot of questions to get the qualifiers," he added.

To cope with the increased load and the time it takes to get the additional information, Northwestern is "seriously considering" ways to enlarge the capacity of its present reservation system, which now has the bulk of its work done by a Univac 494 mainframe.

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Two Specialized Processors Join NCSS 3200

(Continued from Page 1)
runs on the remote unit and an applications processing version runs on the back end.

The back-end processor is not just for off-loading data base management functions, McGuire said, even though that is one application that could be implemented on a Server. The Server would be located physically at a 3200/Host site, he said, and could also be used to off-load the host of particularly time-consuming jobs.

For example, a user with Fortran programs that involve lengthy calculations might choose to off-load those programs from the host and have them run on a Server, he suggested.

The basic main memory for the Server processor is 1M byte, expandable in 256K-byte increments to a maximum of 4M bytes. The basic unit comes with one byte multiplexer and one selector channel, which can be expanded to five in any combination.

The unit can handle a maximum of 32 disk controllers and up to 128 disk drives with either 75M or 200M bytes per drive. Optional two-channel switches are available on the disk control units.

A basic Server processor costs $42,000, but the "Server systems package" consisting of the VPS/Server operating system, network and interprocessor communications software, console printer, 1M byte of memory, Server/Host interface equipment, an integrated disk controller and 200M-byte disk drive costs $79,900 for a total system cost of $121,900.

In addition, NCSS said its proprietary data base management system, Nomad, has been specialized to run on the Server processor. The Nomad/-Server DBMS costs $8,750 and the Nomad/Server report writer runs $3,750.

Front-End Communications

In comparison, a 3200/Host of roughly the same configuration but with the full VPS operating system plus the greater capabilities in the hardware will cost about $250,000.

The 3200/Remote processor has been modified specifically for the other end of the process — front-end communications. It operates under the direction of a 3200/Host processor or other host under VPS.

The minimum main memory is 768K bytes, expandable to a maximum of 1.5M bytes. It comes with one byte multiplexer and one selector channel and can handle up to 32 communications lines through an integrated adapter.

The remote processor can only work with the host. While it can execute applications and other programs, it cannot compile such programs. Programs compiled in the host, however, can be down-loaded to the remote system for execution, the firm said.

Requests for functions not currently available on the 3200/Remote processor are automatically forwarded to the host, the firm added, and a remote processor can access data or programs running on a Server processor through the host.

The 3200/Remote processor by itself can be purchased for $42,000, but the "Remote System Package," which adds VPS/Remote and network software, a console printer, 768K bytes of memory, a 75M-byte disk and controller and the communications adapter, costs $85,000, bringing the total to $127,500.

The Nomad/Remote DBMS costs $7,700 and the Nomad/Remote report writer costs $3,300.

The VP/Host operating system, which is included in the price of the NCSS 3200/Host system, is compatible with the VP/CSS operating system used on the NCSS remote computing services network, serving 10,000 users nationwide, the firm said.

The operating system for the 3200/Host provides simultaneous interactive, remote job entry and batch processing capabilities. It uses the CSS file system and the IBM OS-compatible access methods, the CSS command language, the Exec command processor, CSS disk/tape/sort utilities, the VP user directory to control system resources and VP operator facilities.

A 3200/Host working with 3200/Servers and/or 3200/Remote would present a single system image to each user, allowing both local and remote users to share data, peripherals and processing power, NCSS said from 542 Westport Ave., Norwalk, Conn. 06851.

Just One Chef Needed for Future Offices

(Continued from Page 1)
At a recent seminar, Krasan's company surveyed executives from about 100 firms in the greater New York area to track how office-of-the-future technologies are integrated into business organizations.

Results showed that while 51% of the respondents indicated they were developing long-range plans for office-of-the-future considerations, few had formulated a clear-cut means to that end.

For example, responsibilities for selecting word processing equipment were not clearly defined in most cases. Asked if acquiring such equipment were a centralized, corporate line technology decision, 60% of the executives polled said they did not know.

Similarly, 53% were not sure if their firms used a corporate selection process, and an equal number didn't know whether equipment was chosen by individual departments.

Communications Policy

Forty-three percent of the survey respondents indicated their companies had no telecommunications department, while only a small percentage considered telecommunications part of DP (38%) or of administration (20%).

Those corporations that divide control of communications, word processing and data processing among separate departments will find it difficult to later lasso these technologies into a combination that will work effectively and efficiently in the office, Krasan pointed out.

As an example, word processing traditionally was viewed as a way to minimize typing needs and consequently, the communications capabilities of word processing were overlooked.

Indeed, the survey showed that while 80% of the responding companies are either using or planning to install sophisticated word processing equipment, only 16% have installed electronic mail systems.

Tunnel vision is not limited to word processing. To handle communications needs, firms often hired telephone company executives who brought with them a knowledge of, if not a bias toward, the Bell System, Krasan said.

Even today, only 24% of the companies surveyed indicated they were using independent communications carriers. Likewise, only the same small percentage have taken advantage of computer-based least cost telephone communications routing systems that, according to Krasan, can reduce phone bills by an average of 15% to 20%.

Separate Department

By setting up a separate department dedicated to merging word processing, communications and data processing from an overall corporate perspective, firms can avoid entrenching their office of the future in the Dark Ages.

Unfortunately, many business organizations have yet to forge a workable path to efficient office automation. About 37% of the executives questioned said their firms were planning in the next year to build a new division or corporate facility. But their plans did not provide for the additional cabling, power or electrical air conditioning required for an automated office.

According to Krasan, about one-half ton of air conditioning is needed for each work processing station configured with a standard CRT, small letter quality printer and floppy disk.

"Most corporations leave building plans to their architects who usually are not familiar with office-of-the-future needs," he said.

As a result, firms often fail to allow for space in building walls for co-axial cables to provide video on each floor.

Management Hesitates

Still, corporate management remains hesitant about setting up separate departments to give an overall direction to implementing the office of the future, he commented.

Records management, for example, "is a real sleeper in most companies," Krasan noted. "It's often used as a warehouse to dump records, perhaps on microfilm."

He emphasized that blending microfilm technology and word processing by storing key descripters on a CRT system can expand the records management function to include sort, search, update and copying capabilities.

Survey findings are available free to the general public from Peat, Marwick, Mitchell & Co. at 354 Park Ave., New York, N.Y. 10022.

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Buried Near Jai-Alai Fronton

Printouts Focus of Betting, Arson Investigation

By Marguerite Zientara
CW Staff

MANGONIA PARK, Fla. — Computer records that had been buried behind a former jai-alai fronton, or arena, since last winter are playing a key role in an arson investigation and a statewide probe into possible parimutuel betting improprieties throughout Florida.

Palm Beach County Sheriff's officials, while examining an arson fire that destroyed the former Palm Beach Jai-Alai Fronton, "ran into several questionable areas related to the [betting] operation," according to Capt. Richard Sheets of the Sheriff's Office.

Acting on an anonymous tip, backhoe crews dug for four days behind the fronton and reportedly came up with computer betting records, mutuel records and jai-alai tickets. While Sheet said he did not know why the computer records had been buried, investigators indicated they had uncovered discrepancies in reports of what records had been destroyed in the fire.

A possible link between the arson and any questionable betting operations "would have to be considered," Sheets said.

The computer printouts have been turned over to auditors from the State Division of Pari-Mutuel Wagering in Miami, who early last week were still waiting for the recovered printouts to dry off so they could remove the dirt.

"We don't want to destroy anything, so we're going to have to be a little patient and allow some of the stuff to dry up before we even attempt to get the dirt off them," investigator Sam Casey observed.

While the auditors intend to study the records carefully and to "subject them to some of the things we want to run checks on," Casey said, he was "not at liberty" to disclose the nature of those tests.

The division's examination of the records is part of a statewide investigation into possible irregularities in wagering activities.

Through interviews conducted as part of the Palm Beach arson investigation, "it became known to the state that there were large systems bettors and so forth throughout the state, and that pretty much put us on the right tack," Casey said.

"We are looking into other frontons within the state to determine to what degree systems betting is taking place and of what magnitude the problem is," he added.

"Systems bettors" refers to people who bet a "list" of specific combinations, determined through mathematical probabilities, that are likely to come in most frequently, Casey explained.

While systems betting is not illegal in the state of Florida, "it leads to other things." Preferential treatment could be accorded to list bettors, Casey said, because they invest "quite a bit of money" in the fronton in terms of betting.

The computer printouts to be studied contain records of all tickets sold every day from each machine. Each ticket sold registers as a transaction in the computer. During a final cycle run at the end of the day, the computer indicates how many tickets were sold at each machine and verifies the amount of money involved.

While Casey explained that the computers print out "everything" at the track, he was "not at liberty to say" how the printouts might indicate any irregularities in betting practices.

If the investigation should turn up improprieties, Casey said, the State Director of Pari-Mutuel Wagering could elect to suspend a licensee's license, levy a fine or both; he might also revoke the licensee's license.

Software Meet Set for March

SANTA CLARA, Calif. — Users, developers and researchers with information to share on software tools for improving programming productivity are invited to participate in a Conference on Application Development Systems (Coads) March 9-11.

The conference will examine how to tackle the high costs of developing computer applications, according to conference chairman Dr. Eric D. Carlson of the IBM research laboratory in San Jose, Calif.

IBM will be one of four sponsoring organizations. Others are the Special Interest Group on Business Data Processing of the Association for Computing Machinery (ACM); the Center for Information Systems Research at MIT's Sloan School of Management and the Computer and Information Systems Department of the Graduate School of Management of the University of California in Los Angeles.

Because reports of hands-on experience with these tools are scarce, Coads is calling for papers that describe "home-grown" systems or provide practical examples of the ways in which these tools have been used.

More information is available from Carlson, Conference on Application Development Systems, IBM Research Laboratory, K52/282, 5600 Cottle Road, San Jose, Calif. 95193.

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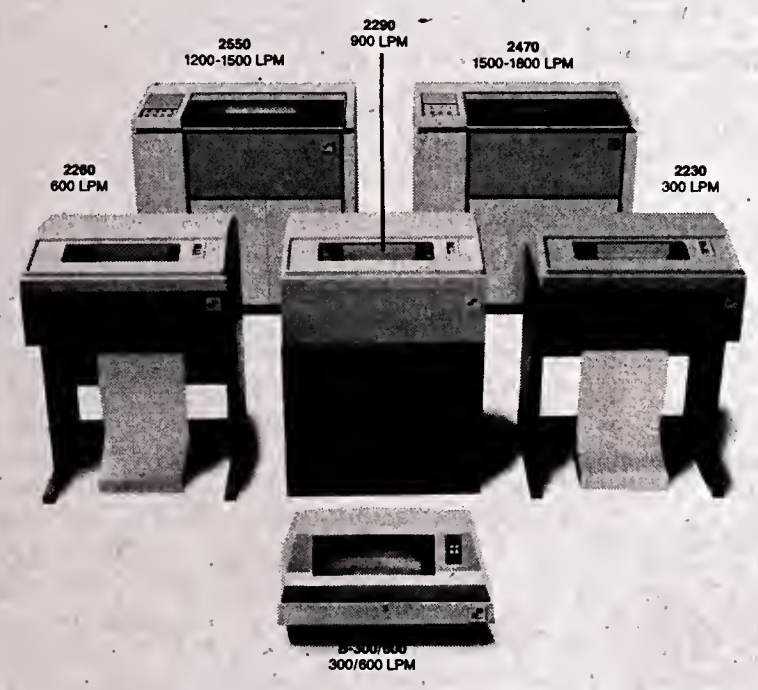

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House Rejects Gas Plan

By Marguerite Zientara
CW Staff

WASHINGTON, D.C — The House of Representatives rejected President Carter's proposed gasoline-rationing plan that would have utilized "large bank computer centers" to process gasoline-ration checks and coupons [CW, April 9].

The major stumbling block to the plan's passage seemed to be the last-minute concession to dole out ration coupons to states based on their past use of gasoline. That item caused differences of opinion between representatives whose states would have received generous gas supplies and those that would not have fared as well.

Banks: Relieved, Concerned

The plan called for distributing gasoline-ration coupons to consumers through financial institutions and possibly through department stores and other centrally located places. About 15 regional processing centers would have done the bookkeeping and computer processing.

The banking industry seems to be "relieved on the one hand that at least temporarily [it isn't] faced with redeeming gas-rationing checks or coupons," according to Robbie Robinson of the American Bankers Association Operations/Automation Division. "Yet, on the other hand, [banks] still have to be a little concerned about what the nation's energy future looks like without some kind of gas-rationing plan on the shelf."

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Olympics: Herculean Task For Reservation System

By Ann Dooley
CW Staff

NEW YORK — The 1980 Summer Olympics in Moscow promises to yield a lot of toil, sweat, tears and spectacular performances from participants under pressure.

But here in New York agents at the official U.S. Olympic travel agency arranging reservations for American tourists believe they will be able to get through their Olympian task with the aid of an automated reservation and accounts receivable system designed especially for the tourist onslaught.

As many as 24,000 Americans from across the country will be attending the Olympic Games in July 1980 and air flights, accommodations, food and entertainment, as well as tickets to five days of events must be planned and scheduled for each tourist. If a computer were not keeping track of all the tourists and their reservations, it would take at least 200 more people to do it all, Robert Corrado, manager of the Russian Travel Bureau and Orbitair Ltd's. Olympic travel section, estimated.

As the official U.S. travel agency responsible for arranging reservations for all Americans attending the Summer Olympics, the Russian Travel Bureau contracted with The Haley Corp., a liaison agency between U.S. travel agencies and hotels in the Caribbean, to access Haley's computer system on a leased-line basis. Two Telex Corp. Model 3077 plug-compatible terminals in the travel agent's office are linked to an IBM 370/158 at Haley's

In addition to obtaining access to the computer, a separate office staff was hired to coordinate activities for the event.

Rotating Visits

The staff will plan tours for 24,000 tourists and ration out 230,000 tickets to the Olympic Games. Because of limited space, only 8,000 accommodations will be available to U.S. tourists in Moscow each night. The agency is therefore arranging different tours and rotating visiting time in Moscow. While one group is in Moscow at the games, another group will be touring a different Soviet city. In this manner, 24,000 people can view some part of the Olympics.

All this scheduling would be a "nightmare" without an automated method to handle, sort and compare the data, Corrado said. The system is now being used as a management information system to indicate when various tours and hotel rooms become filled.

The two tours being offered, one for 15 days at $1,550 and one for 22 days at $1,850 permit the visitor to attend five days of Olympic events. Some people have complained because they cannot attend all the games, but the rotation is the only fair way of handling it, Corrado said.

Tracking Payments

An installment payment plan is being run on the system to keep track of the money paid between the time a reservation is first made and the deadline for payments. The computer is also programmed to send payment due notices to people who have made reservations.

In addition, it will send the Olympic tickets to the tourists once they have been received by the travel agency.

Insurance for the trip is processed on the system, which also performs a daily reconciliation program indicating reservations made that day, checks accepted and insurance forms received. A monthly reconciliation gives an overview of the amount of space available, and extra runs can be performed as needed.

To date, 60% of the space is filled. Corrado believes that by September, all the spaces will be taken except for those opened by cancellations.

Travel agents throughout the country must make reservations for the Olympics through the Russian Travel Bureau. These reservations are kept on the system and added to the main files.

The system is also used to provide models that indicate how air transportation should be arranged and how people can be accommodated in air packages, as well as to project what the accommodation situation will be in each city of the circuit at each tour time.

The system also selects cities throughout the U.S. for gateway departures so tourists can arrive as a group and transfer planes at New York's Kennedy International Airport before flying to the Soviet Union. The computer selects the cities by collecting tourists' Zip Codes and matching groups with nearby airports for departure.

Since the Soviet Union's visa forms are lengthy, the system can cull data on each passenger and print it on the form, which is then sent to the passenger to complete.

Travelers are given their choice of travel dates, length of tour, game events and important dates like the opening and closing of the Olympics. All these preferences are input into the system and, when collected, will be matched so that everyone will get all or at least some of his top choices.

Since the tickets to the actual events will not be sent out until 90 days before the Olympics to avoid forgeries, there could be a real scramble to match events to people at the last minute, Corrado said.

The system keeps a file on each tourist with data such as the number of people in a party, tour choices, amount of deposit and dates of arrival and departure.

The agency will also handle reservations for the athletes and their families, but will do so without the computer system. The actual members of the Olymic teams won't be known until much later; they and their families will require more individualized attention. The families of the team members will be allowed to stay the duration of the two-week games.

The programs used by the agency were designed especially for the Olympic reservations and are written in Cobol for IBM's Customer Information Control System. Arthur Misata, DP director for Haley and the author of the programs, said they are fairly basic, amounting to an accounts receivable system with tour and ticket scheduling capabilities and survey analysis capability for ticket preference and tours.

Once the 1980 Summer Olympics are over, the Russian Tourist Bureau will probably drop its link to the computer system because the need for it will be reduced, according to Corrado."

'Is That You, Dear? How Did Your Idea About Predicting Winners at the Race Track Using a Computer Work Out?'

Lists Ways to Boost Employee Output

Tarkenton Chides Managers' Lack of Feedback

By Jeffry Beeler
CW West Coast Bureau

MARINA DEL REY, Calif. — Lack of constructive feedback "mars a DP manager's performance more than any other occupational flaw," according to former Minnesota Vikings quarterback Fran Tarkenton.

All employees need periodic praise for their professional strengths and constructive criticism for their weaknesses. Unfortunately, most managers — including DP managers — prove sadly lacking in both the quality and quantity of their feedback, Tarkenton told users at the Management '79 conference sponsored recently by Management Science America, Inc.

Tarkenton, who heads a management consulting firm named Behavioral Systems, Inc., called motivation the "key" to boosting employee productivity in a DP shop or anywhere else. "I don't care how technologically sophisticated your business is, it's still run by people," and people need to be motivated, he said.

Managers can spur their subordinates in part through promises of salary increases, bonuses, promotions and other inducements. But these blandishments alone will not increase output unless managers demonstrate leadership and inspire their employees to their full potential, he asserted.

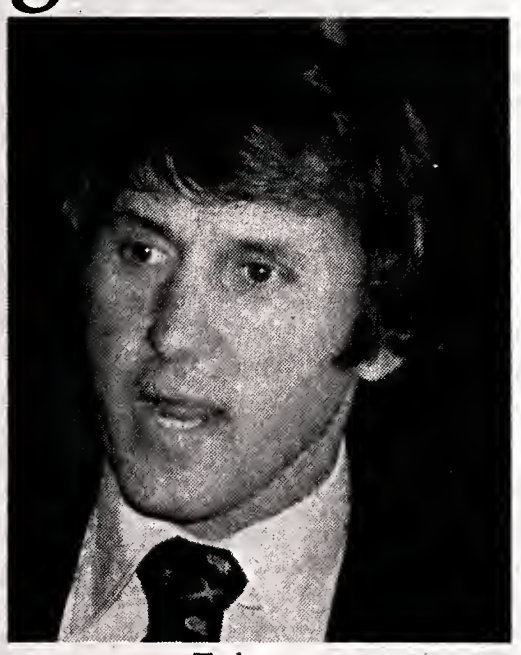
System Lacking

Unfortunately, corporate management in the U.S. lacks a "disciplined system for increasing productivity," Tarkenton said.

"All around me, I see sophisticated technology and financial systems," but in the midst of all these advancements, "productivity in this country is tied with Great Britain's for the slowest growth in the western world."

How can DP managers boost the sagging output of the staffers working under them?

First, managers should evaluate their method of giving directions. Each employee should have a realistic set of on-the-job objectives and, just as important, have specific guidelines for achieving those objectives.



Tarkenton

Second, managers should assess their methods of measuring employee performance. Are their methods subjective or objective? What kind of feedback do managers give their employees? Do they provide it regularly, or do they simply "chew out" their subordinates when they make a mistake?

Problems Reflect Quality

To a large extent, the amount of time a firm spends tackling internal problems reflects the quality of the organization's management. "Bad companies don't have problems," Tarkenton asserted. "Only good companies have problems because they're always trying to correct them."

Third, managers should reevaluate and possibly devise new means for motivating employees to improve their performance.

Fourth, managers should take a long, hard look at how they manage themselves. Just as underlings need to set and pursue realistic objectives, so do department heads. Of particular importance are questions of how they budget their time and how they select problems and reach decisions.

Finally, managers should make sure that any formal training their employees receive is immediately applied in their jobs. Too often, Tarkenton said, employees attend seminars or undergo other forms of professional self-development only to forget everything they learned as soon as they return to work.

On-the-Job Humility

Elsewhere in his address, Tarkenton drew parallels between the personal lessons learned on the football field and those learned in business, especially in the DP side of business. Illustrating his points liberally with vignettes from his professional-football-playing days, Tarkenton stressed the value of learning on-the-job humility.

DP managers, like athletes, should realize their "teams" can "play" without them, however difficult that hard fact might prove to accept. "You're no stronger than the people around you," Tarkenton said. Then he added, "There is no single superstar on a team. Everyone's a superstar."

Parker Faults Ribicoff Crime Bill

By Jeffry Beeler
CW West Coast Bureau

MARINA DEL REY, Calif. — Computer crime expert Donn Parker recently excoriated the computer crime bill sponsored by Sen. Abraham Ribicoff (D-Conn.) as a "lousy, terrible" piece of legislation, but the SRI International, Inc. consultant voiced support for the proposed law anyway.

Parker criticized S. 240 as an imprecisely worded bill drafted by lawmakers who know little, if anything, about computing.

As it currently stands, the legislation would impose the same harsh penalties — a prison sentence of up to 15 years and a fine of up to $50,000 — for relatively innocuous CPU use as for full-fledged thefts or frauds. Even computer activities like producing Snoopy calendars, playing Star Trek or maintaining bowling scores could qualify as crimes under S.240, Parker warned at a recent conference sponsored by Management Science America, Inc.

The bill also lacks a sufficiently narrow scope, he said. In effect, S. 240 defines a computer system as a piece of hardware containing intelligence. Thus, it embraces not just commercial processors but many types of equipment it was never meant to cover, including digital watches, microwave ovens and any auto with a microprocessor-controlled combustion system.

But despite these serious flaws, Parker characterized the proposed law as necessary to combat the growing threat of computer crime.

"We can no longer afford to have people playing games with computers handling billions and billions of dollars," and the bill will help discourage just such abuses, he said. "It will tell us what is and is not authorized use."

High-Loss Crimes

Speaking at MSA's Management '79 conference, Parker told an estimated 250 DPers that low-incidence/high-loss crimes will pose the gravest danger to computer security during the coming years. Such crimes will occur only rarely, but when they do, the consequences will prove "monstrous," he predicted.

Parker

Although lone individuals will commit some low-incidence/high-loss computer crimes, the vast majority of these illegal activities will be perpetrated by groups like organized crime, terrorist bands and foreign powers, he predicted.

The Mob will merit particularly close scrutiny. "All the attractions are there for organized crime to get heavily involved in computer crime during the next few years," Parker warned.

DP crime will also continue to pose a serious problem for U.S. campuses. Universities often encourage their students to become computer criminals through their computer science curricula, and "I don't think that's a very healthy thing for us to be doing," he said.

At one university, investigators have already uncovered a "computer crash club" whose members qualify for admission by proving they have crashed the campus mainframe.

Such revelations dramatize the vulnerability of most on-line processors to sabotage or unauthorized use.

With the rapid growth of hardware and software technology, computers have increasingly become the vaults for many companies' funds and important records. Unfortunately for users, "a criminal working from a phone in Outer Mongolia could theoretically perpetrate a theft from a bank in Los Angeles," Parker said.

As a result, "the company vault has moved from the bank into the criminal's bedroom, or wherever he happens to have a phone," he added.

One reason for the growing vulnerability of computers lies in DP technology itself, which has advanced much more rapidly than users' and lawmakers' ability to control it.

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COMPUTERWORLD
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Office of Future May Not Work, Poppel Warns

By Connie Winkler
CW Staff

NEW YORK — The office of the future may not work. Fancy word processing machines are sitting unused in corners at some businesses, Harvey L. Poppel said, describing a phenomenon he's observed in the last six to nine months. Poppel is a management consultant specializing in information systems and a senior vice-president at Booz Allen & Hamilton, Inc.

New word processing machines are unused because there's only so much blood you can squeeze out of a turnip. The machines were brought in to improve clerical production and cut costs, but in many instances there's small room for improvement.

"There are some gains to be made, but not many," Poppel said about the office of the future for clerical employees. Only 20% of a secretary's time is spent typing, so a 50% improvement in typing speed amounts to just 10% efficiency improvement.

If the office of the future doesn't work, IBM, Xerox Corp., ITT and AT&T want to know why. They're four of the firms and government agencies that have signed up for Poppel's latest study on what's wrong with the office of the future. Now under way, the study is expected to be completed in nine months.

Into Managerial Suites

The study postulates that the office of the future has to be moved into professional and managerial suites. "The incongruity between the enormous growth in automated office systems and the virtually nonexistent rise in office productivity clearly points out that creating equipment alone cannot solve today's management problems," he said.

The emphasis has been on reducing the cost of office support equipment and people — telephone operators, receptionists and mail clerks. But attacking office support costs doesn't work because it threatens secretarial support at a time when managers and professionals need it most. Professionals resent losing extra telephone buttons or next-door copying machines, Poppel explained.

"What we found was that we were really dealing with the wrong problem," he said about Booz Allen studies to date on the office of the future. "The real problem is helping managers and professionals do a better job."

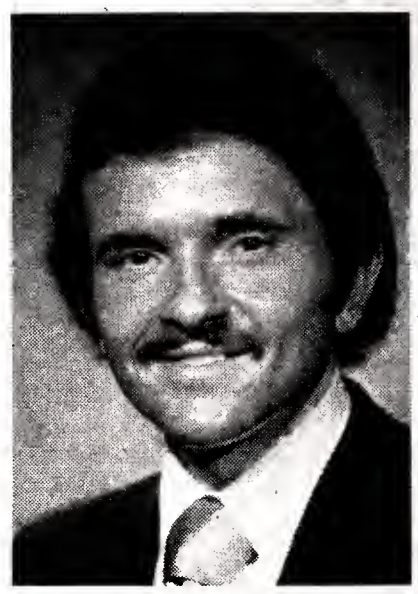
A typical professional spends 25% of his time on nonprofessional tasks. Few professionals — perhaps stockbrokers and design engineers — use terminals in their work. And this includes pockets of automation in industries where office systems are pilot projects as well as Citicorp in New York, probably the most sophisticated office-of-the-future firm.

To find out how the office of the future can help the professional and managerial, white-collar employee, Booz Allen starts by measuring the cost of whatever work product the person produces. In one government study, Booz Allen discovered it cost $88 for an employee to fill out a travel request — even for a short automobile trip or a shuttle flight between New York and Washington, D.C. "The travel request doubled the cost of the trip," Poppel observed.

A similar costing-out process can be performed for managers whose primary acitivities are monitoring others. By looking at the kinds of information needed for monitoring, the consultants can improve that exchange of information.

'Bourgeoisification' Begins

With the aim of helping the professional, the study will look at all the options for the office — conventional word processing, intelligent terminals, sophisticated telephone systems or electronic mail. There's no single solution, according to Poppel, who calls this spreading of automation to professionals "bourgeoisification."



Harvey L. Poppel

Poppel recognizes that with 33 million office workers and 20 million professionals, moving the office of the future to professional suites means a lot of hardware. But he believes the business argument for it will help persuade business executives.

"Up until now we haven't been able to make the hard business case for it," he said.

According to Poppel, the time for the study and change is now:

- Technology is mature so tools like video conference are economical.
- Great economic pressure to improve productivity is evident in the U.S. "There's a trend away from growth and diversification and toward getting more out of what we have," Poppel said.
- Society is adjusted to the idea of technology as a part of everyday work, and business schools are turning out graduates familiar with technology.

DEC, Omaha Steaks Make Out-of-Court Settlement

OMAHA, Neb. — Digital Equipment Corp. has made an out-of-court settlement for an undisclosed amount in a $1 million lawsuit filed against it last June by Omaha Steaks International [CW, Nov. 27].

Omaha Steaks claimed in its suit that DEC sold the mail-order, food-marketing firm a "fatally defective" PDP-11/34 computer system. As part of the settlement, Omaha Steaks and its legal counsel are prohibited from disclosing the amount or anything else about the agreement "except that it was satisfactory," according to Omaha Steaks President Alan D. Simon.

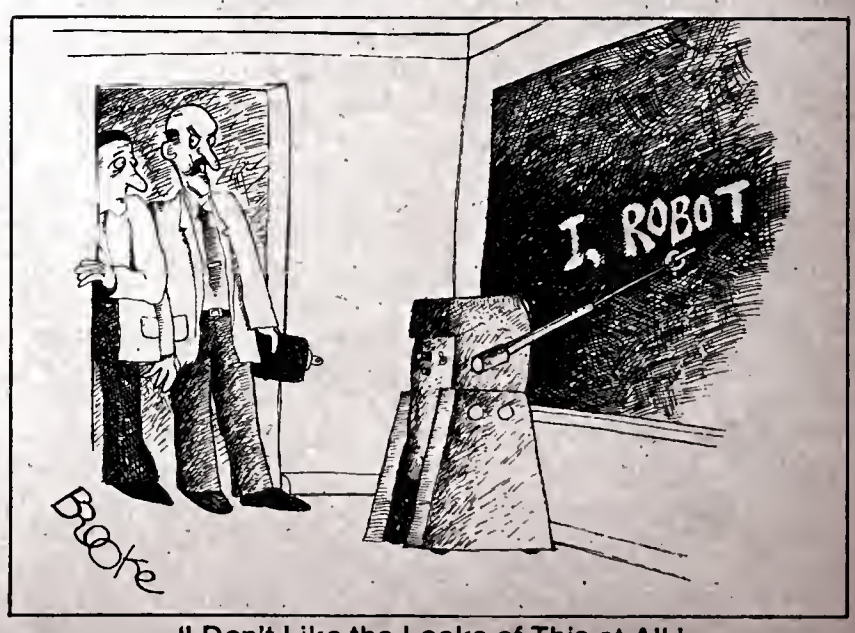
The suit charged that DEC installed the computer equipment in July 1977, but failed to make it work for on-line order entry operations until January 1978. The six-month delay intensified Omaha Steaks' Christmas crunch, and the firm fell behind by "about 9,000 orders," the suit said.

Furthermore, when the system did go on-line in January, it reportedly failed to operate on more than 20 business days over the next two months. While the problems appeared to be in the tape and disk drives and the CPU, Simon concluded that the system was simply a "lemon" — with a price tag of $193,943.20.

DEC, on the other hand, maintained that Omaha Steaks failed to provide the proper kind of environment, primarily in terms of power source. A DEC spokesman said other equipment was drawing power from the same line as the computer system.

Eight months after the equipment was installed, Omaha Steaks sold the system to an OEM company, and used a manual, order-entry system for five months. In July 1978, Omaha Steaks acquired a comparable system from Qantel Corp., which has run smoothly from the beginning, according to Simon.

"The only difference between the two systems was that one worked and the other didn't," he remarked.



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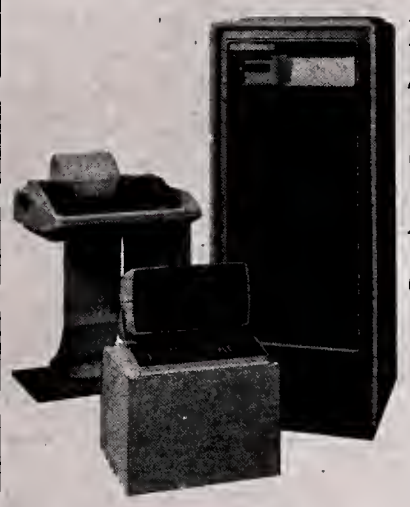

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Puritan Life's Petition Approved

No Tax on Application Software in Rhode Island

By Marguerite Zientara
CW Staff

PROVIDENCE, R.I. — The state tax administrator has ruled in favor of Puritan Life Insurance Co.'s petition for a review of the sales and use taxes levied on its application software.

The ruling closes a case initiated in September 1977, when Puritan Life filed two petitions with the state tax administrator. One petition sought to eliminate an administrative rule taxing software as "tangible personal property." The second petition was for a hearing on the firm's own tax assessment [CW, Sept. 12, 1977].

An administrative hearing was held April 6, 1978 [CW, April 24, 1978]. The recent ruling clarified that, while Rhode Island law calls for the taxation of software "needed to make the computer operate," Puritan's software in question was application software and therefore not taxable.

Concerning Puritan's challenge of the validity of the rule taxing software in general, the tax administrator held that the rule was adopted in conformity with the requirements of the Administrative Procedures Act and therefore was properly promulgated, according to H. Peter Olsen, an attorney with Hinckley, Allen, Salisbury & Parsons and one of Puritan's lawyers in the case. The administrator's ruling did not address the issue of the rule's validity.

Case-by-Case Rulings

While Puritan Life Insurance Co. is now exempt from paying tax on its application programs, other firms in the state will be considered on a case-by-case basis, according to Ed Goldkamp, the hearing officer in the case.

"Right now we've got several more [petitions] scheduled for hearing," Goldkamp said, "some who have tied their stars to Puritan Life."

While the cases will be decided individually, "I think that if we're dealing with the application-type programs, and probably involving a good deal of professional services on the part of [their] vendors, to that extent they probably will not be subject to the tax.

"If you buy [a program] off the shelf — if that's at all possible in this day and age — then I think we're still operating on the theory that this would be subject to the tax," Goldkamp said.

Other states that have made similar rulings include Alabama, Arizona, Florida, Louisiana, Minnesota, New Jersey, New Mexico, New York, Ohio, Vermont and Wisconsin.

Lawyers in the case were surprised and pleased with the ruling. "It is extremely rare in Rhode Island for a taxpayer to prevail on an issue at administrative hearing," Olsen noted.

On-Site Courses Cover IMS/VS

PALO ALTO, Calif. — The Professional Services Group of Informatics, Inc. is offering eight courses on analysis, programming and operations that include information on Release 1.1.5 of IBM's IMS/VS.

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Also available are courses in "MFS for Network Administration" (one day), "Applications Analysis" (five days), "Data Base Design" (five days), "Applications Analysis" (five days), "Data Base Design" (five days) and "Master Terminal Operations" (four days).

Per-student fees for private on-site instruction start at $50 per class day and cover instructor travel and materials.

IMS course descriptions can be obtained from Dan Brooks, IMS services manager, Professional Services Group, Informatics, Inc., 1121 San Antonio Road, Palo Alto, Calif. 94303.

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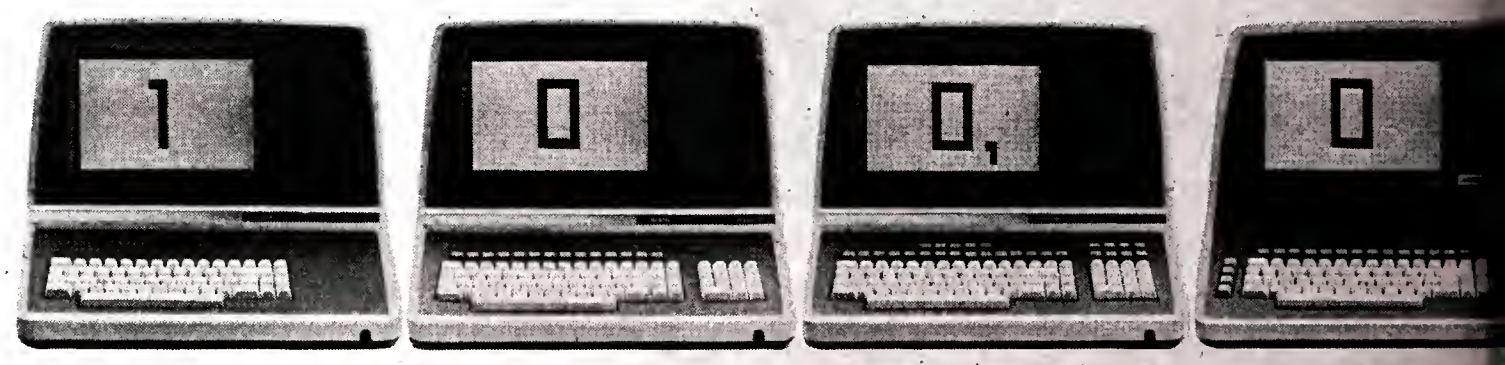

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DPMA Takes Stand Against DPer Standards

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Data Processing Management Association (DPMA) has come out strongly against proposed classification and qualification standards for federal DP personnel.

In a position paper made public recently by George R. Eggert, DPMA international president, the association called for the proposed standards to be rewritten under the guidance of a task force representing industry, government and academia. The current proposals were drafted by the Office of Personnel Management (OPM).

The proposed standards, issued in November by OPM (formerly the Civil Service Commission), constitute a complete revision of job classification standards for "computer specialists" — which include programmers, programmer/analysts and systems analysts — and "computer clerks and assistants."

The proposals were widely criticized within government DP circles and by various groups such as the Federal ADP Users Group, the Interagency Committee on Automatic Data Processing and the American Federation of Information Processing Societies.

The DPMA position paper said the association finds the proposed standards to be "unreflective of current employment trends in the private sector and as unmanageable in responding to expected technology advancements that will impact upon the future employment structure of the computer professions."

The standards are unacceptable because they do not provide for a high-level computer specialist position, do not offer sufficient entry-level pay, do not call for needed DP training programs and fail to mandate certification for certain government DP positions.

More Research?

The association recommended that a "team of consultants representing business, industry, education and government be recruited to assist in the preparation of new standards." OPM is currently reviewing comments it has received on the proposals.

David Gilmore, personnel management specialist of the OPM Standards Division, who drafted the proposed computer specialist standards, said recently that OPM might do additional field research to help it revise the standards. In an earlier interview, he said that depending on the content of the comments OPM receives, the standards may be completely rewritten and sent out for additional public comments before being finalized [CW, Feb. 12].

OPM Director Alan K. Campbell, in an April 30 letter transmitting DPMA's position paper to Steven J. Jost, DPMA's Washington, D.C., office director, said "The weaknesses of these proposed standards are of serious concern to [DPMA members] not only because some of them are directly affected as federal employees, but for the impact federal personnel standards have on any professional group as a whole."

The position paper, drafted by the association's Corporate Operations Committee, said "as the largest single employer of data processing professionals, and as an example to state and local governments and other employers, the government should endeavor to develop employment standards that conform to modern business and industry standards as applied to the computer industry. Such a reform of the outdated federal standards now in use will bring greater efficiency into federal data processing operations and improve the delivery of government services."

Besides recommending the recruitment of a task force to help prepare standards, DPMA also suggested that "the range of specialization in the computer grade series be broadened to include a high-level professional series and to conform with the degree of specialization used in other federal grade series for the professions of accounting, math and statistics and personnel management."

At the entry level, DPMA said, positions should "reflect the salary compensation generally accorded similar jobs in business and industry. Current federal compensations do not approach generally accepted medians in the private sector and, hence, hamper the government's efforts to attract competent applicants."

OPM's Gilmore conceded that entry-level salaries are below private-sector norms, but explained that the salary levels are set by law and any changes in entry-level pay will have to be brought about through congressional action.

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Progress of Micro Seen as Realization of Dream

By Jay Woodruff
CW Staff

CAMBRIDGE, Mass. — Since Intel Corp. brought out its four-bit CPU in 1971, nearly 100 microprocessor products have reached the market, "automating things we never dreamed we could control before," Bert Cowen told a gathering of DPers here recently.

The occasion was Necon 79, the Data Processing Management Association's spring conference.

The key to change in the microcomputer business lies in the fact that fewer and fewer micros are needed to perform more functions, according to the independent consultant. An 8-bit computer system required approximately 137 basic chips in 1971, and an interface control used another 100 chips.

A complete system would need such things as buffers and clocking, requiring even more chips.

By 1978, an 8-bit processor with 2K bytes of read-only memory (ROM) and 4K bytes of memory could be constructed with 10 integrated circuits, giving the user nearly double the number of instructions and a lower cycle time, Cowen said.

An interface to a floppy disk, which would have required hundreds of chips a number of years ago, can now be made with a single chip, he added.

High-level languages like Cobol and Fortran are now supported on microprocessor systems, and scientific application software is available.

The result of these advances is "a widespread and rapid dissemination of microprocessor resources," Cowen indicated. To illustrate the way micros have lowered costs and increased performance, he traced the evolution of the Hewlett-Packard Co. HP 9100A desktop calculator, a device that weighed 40 pounds, featured a magnetic card reader, a plotter interface and 196 programmable steps and sold for $4,900 when it was introduced in 1968.

Over its four-year life span, the calculator's price dropped $500. In 1972, it was replaced by the microprocessor-based 9810, boasting 500 program steps, a 16-column printer, a plotter and a cassette tape system for two-thirds the cost of the 9100A.

In 1976, the 9815 was introduced. Though its $2,900 price and 472 program steps may not have seemed a great advance over HP's previous desktop calculator, the 9815 was expandable to 4,000 steps and its memory allocation was "unrestricted," Cowen said.

The unit can connect to many more peripherals, more capabilities have been put into it and the price remains at $2,900.

HP's handheld programmable calculator — the HP 67 — delivers approximately the same performance as the 9100A, but at one-sixth the cost and with a weight of 11 ounces, Cowen pointed out.

"And because it is handheld, it has been used in widespread applications that the 9100A would never have been used for, with its weight and size," he added.

The cost per unit of utility has gone down each year. Digital Equipment Corp.'s first minicomputer cost about $100,000, while a CPU with the same performance now costs $2,000. "I don't think we're through seeing microprocessor prices drop or an end to the kinds of uses they are put to," Cowen suggested.

'Heady Glow' Dims

However, the heady glow of optimism surrounding the microprocessor's increasing performance and declining cost may mask some of the disadvantages of its widespread use, the consultant warned.

"There is a trend toward categorizing people," he said. Microprocessors will first be marketed where they will make the most money. Certain groups will be denied the benefits of micros because it will not be profitable to provide those benefits.

Also, businesses and private individuals are likely to be adversely affected by the use of microprocessors in banking applications, especially by the trend toward automatic bill paying which will reduce "float" — that grace period between the time one writes a check and the time the bank posts it to the customer's account.

"Some people need room to maneuver, but if we must pay bills automatically, we won't be permitted that discretion. Already the float has been shortened enormously — from about a week to two or three days," he said.

People who can't function within the stricter financial system will lose some of the freedom they now enjoy.

Those "outside the tracks could be doomed to failure," especially if microprocessors are used in new applications before the consequences are considered, Cowen warned.

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After a 15-Month Hassle, Junction City, Ore., Gets Small Business System Up

By Marcy Rosenberg
CW Staff

JUNCTION CITY, Ore. — Sometimes, molehills become mountains.

For example, how does a city's $26,875 expenditure to computerize key accounting operations mushroom into a 15-month investment in time to get the microcomputer-based system running?

"Communications between the customer and the vendor was not as strong as it should have been," according to a spokesman for Burroughs Corp., which supplied a B80 disk-based small business system to Junction City.

Bob Fountain, Junction City councilman, was more specific. "We understated our need for education and Burroughs underestimated the storage capacity required to run our applications."

To meet its accounting needs, Junction City ordered three application packages for programming budget records, government payroll and utility billing for 1,180 customers.

These "canned programs" were delivered in January 1978, along with the 124K-byte B80 processor, 2M bytes of floppy disk storage and a 180 char./sec printer.

This configuration was expected to handle all three of the city's applications. But when city workers with little or no training in computer operations or programming tried to implement the budgetary system, "we ran out of room," Fountain said.

A Little Late

After coming to the same conclusion, Burroughs supplied at no cost to its customer $7,000 worth of additional hardware — a second-hand 9480-22 cartridge disk drive to provide 4.6M bytes more storage.

This equipment, however, did not arrive until six months later, in June, when Junction City was nearing the end of its fiscal year and City Hall employees were too swamped with work to devote time to the computer.

Meanwhile, Junction City stopped payment on the system which it bought under a 30-month installment purchase agreement.

Burroughs was patient, Fountain said, noting his was the first city of its size (3,500 population) in the state of Oregon to use the Burroughs system. "We were a showpiece. People have been calling us to find out what we think of Burroughs."

What *does* Junction City think of its supplier? According to Fountain, the firm has been "more than fair." Once the city's workload eased, Burroughs sent several Eugene branch programmers and field engineers to help city employees implement the system.

Together, they developed guidelines for entering and processing data to conform to the city's procedures. "There were idiosyncracies with the program that took hours to overcome," Fountain recalled.

The utility billing system, for example, had to be modified. Part of the year, the city bases water usage charges on the size of the water line; in the summer months, however, those fees are based on the average consumption during three winter months.

By last January, the city's Judiciary Committee, headed by Fountain, set implementation of the computer-based system as its priority goal. To accomplish this, city hall hours, normally 8 a.m. to 5 p.m., were cut back to 10 a.m. to 3 p.m.

While this curtailment cut into such normal activities as collecting utility and building fees, the city incurred no losses. "We got the revenues anyway — in five hours instead of nine," Fountain noted wryly.

The situation improved in February, when utility billing was successfully implemented on the computer to replace a Burroughs 5501 ledger system. Junction City then began paying Burroughs, but it wasn't until the end of March that the computer system took over budget and payroll functions.

Though Fountain claims the city's return on its investment is still two years off, he noted the system has already cut total time for utility billing from four days to one. Currently, this application uses most of available storage, which the city has expanded to 27.6M bytes by adding other disk cartridges.

Hindsight Vision

Reflecting on the city's experience, Fountain recommended that other first-time users invest in computer training for a lay staff.

Initially, Burroughs had advised the city to send its employees to one of the firm's training schools. But because Los Angeles was the nearest location, this would have cost $900 per person. As a result, only one employee — the city recorder — attended the Burroughs budgetary training class.

As for on-site training, Burroughs' Eugene staff was too small to spare time to assist Junction City employees on an ongoing basis, he added.

Had the city been willing at the outset to make the investment to train more of its employees in computer operations, Fountain maintained the implementation process "could have been wrapped up in 90 days."

Cornell Awarded Graphics Grants

ITHACA, N.Y. — Three major grants to refine computer graphics techniques were recently given to the Cornell University Program of Computer Graphics by the National Science Foundation.

The grants, totaling more than $1 million, will be applied to structural engineering and water resources problems. One grant will be used to develop better ways to display graphics material and enter information into the computer.

The second was given to help designers or analysts use computers to design steel-framed structures, while the third will be used to refine an interactive graphics system compatible with minicomputers for water resources planning.

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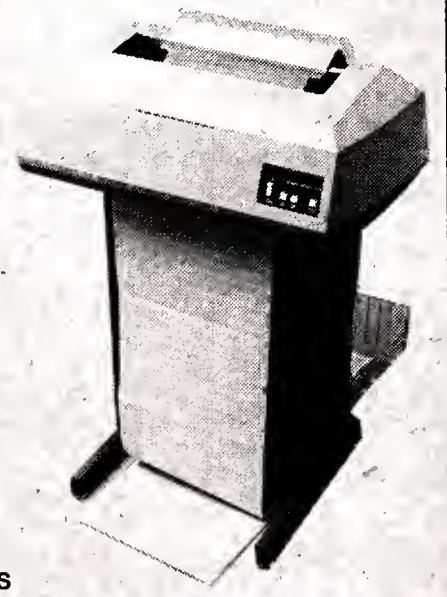

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CAT Scan Locates Scroll Under Mummy's Arm

By John Whitmarsh
CW Staff

PROVIDENCE, R.I. — In a surprise discovery, doctors and technicians at Rhode Island Hospital here have located what they believe is an ancient scroll tucked under the left arm of a 2,300-year-old Egyptian mummy.

The medical team, under the direction of Dr. Michael Scala, an orthopedic surgeon with an historical bent, made the discovery when they turned a powerful computerized axial tomography (CAT) scanner on the mummified body of an Egyptian high priest.

The priest, Nes-Min, was a powerful religious and political figure who lived about 300 B.C. in the city of Apu in upper Egypt. High priests of that period often were buried with written diaries describing their own lives and the times in which they lived.

"Whatever it is, the object is not part of the body tissue of the mummy," according to David Guilmain, CAT radiographer at the hospital. Further scanning to measure the dimensions of the object and to learn its exact depth in the body is planned.

The Nes-Min scroll may prove of particular historical value if it is ever removed from the mummy. The average life span of ancient Egyptians was 28 to 35 years. Nes-Min was in his mid-40s when he died, so the scroll may provide a longer than usual historical record.

New Direction

Archaeological "digging" of this type represents a new direction for CAT scanning. Typically, the machine scans live hospital patients. And because the machine's X-rays are "noninvasive," CAT has come to be used for brain scans in search of tumors and other abnormalities, Guilmain said.

A medical development of the past five years, the CAT scanner has revolutionized X-ray medicine, Guilmain said. It provides a two-dimensional image of human tissue instead of the standard single-dimension X-ray.

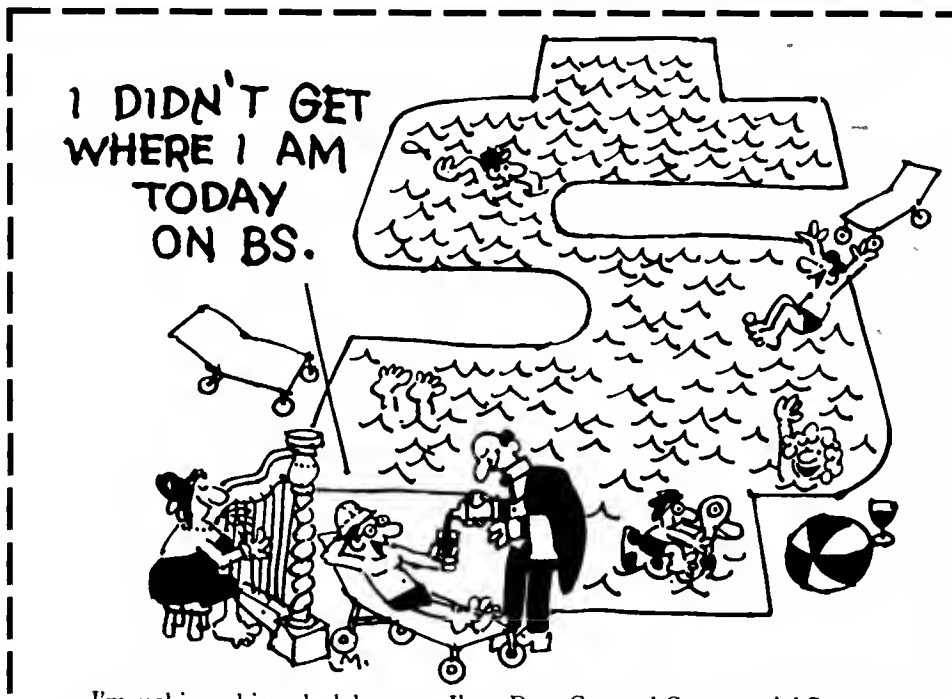
The CAT scanning of Nes-Min, who was loaned to the hospital by the Rhode Island School of Design's Museum of Art, was the first for historical research in the U.S. and only the second such use on record.

A CAT scanner shoots X-rays through human tissues, and those X-ray absorptions are picked up by detectors as they exit the body. The detectors, in turn, are coupled to a computer that interprets each absorption as one of 64 shades of gray. The unexpected densities under the mummy's left arm alerted doctors to the scroll.

Rhode Island Hospital uses an Ohio Nuclear Model 50 CAT scanner. The scanner joins an X-ray tomography unit (the moving X-ray source) with a PSI-11 minicomputer. An image from the detectors is projected onto a TV monitor, and doctors can see the readout of head-tissue densities.

Nes-Min has been on the table before. In 1938, the mummy was "admitted" to Rhode Island Hospital for X-rays. But those were standard X-rays, and the two-dimensional CAT scanning has yielded new knowledge.

For example, Nes-Min suffered from a variety of ailments. He certainly had arthritis, may have contracted syphilis and definitely endured tooth decay. In addition, the CAT scan revealed, the mummy had a genetic defect that left him with a slightly misshapen head.



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Burroughs Exec Lauded

PHILADELPHIA — Robert S. Barton (foreground), director of systems organization research for Burroughs Corp., is the first recipient of the Eckert-Mauchly Computer Architecture Award for his 25 years of innovation, leadership and accomplishment in computer design.

On hand at the Sixth Annual International Symposium held here April 23-25 to present the award that bears their names were (background, left to right) Drs. John W. Mauchly and J. Presper Eckert, who in 1949 co-invented the first electronic computer.

In the award presentation, Barton was cited for his efforts "to make computer systems simpler to understand, simpler to engineer and construct and easier to use for everyone's benefit."

Twenty years ago, Barton led the design team for Burroughs' first large-scale computer, the B5000. In addition to his work at Burroughs, Barton has been a professor of electrical engineering at the University of Utah.

The Eckert-Mauchly award is cosponsored by the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers.

ACM Seeks Nominees

PITTSBURGH, Pa. — The Association for Computing Machinery (ACM) is seeking nominations for its Grace Murray Hopper Award, given each year to outstanding young computer professionals for major technical or service contributions to the computer industry.

Initiated in 1976, the $1,000 award — donated by Univac — is accompanied by a certificate. To be eligible, candidates must have been 30 years of age or younger at the time the qualifying contribution was made.

This year, judges will emphasize contributions in the fields of business DP and personal computing because the award committee feels that these areas have not been adequately rewarded in the past.

Nominations, which may be made by the nominees themselves, should be submitted no later than June 30 and should include the name, address and telephone number of both the person making the nomination and the candidate; a 200- to 500-word statement explaining why the nominee deserves the award; and the date of birth of the candidate as well as the date on which the qualifying work was completed.

Nominating material should be sent to William Wulf, ACM Grace Murray Hopper Award Committee, Carnegie-Mellon University, 5000 Forbes Ave., Pittsburgh, Pa. 15213.

Creates Paperwork Burden

DP Gear Found Slowing Office Productivity

PASADENA, Calif. — Contrary to the popular notion that word and data processing systems can streamline office operations, such equipment may actually slow office productivity.

Too often, substituting a computer-based system for manual paper processing creates more of a paperwork burden than it eases, according to John T. Connell, executive director of the Office Technology Research Group here, in a recent interview.

Connell's organization is an association of senior administrative executives from large corporations who are interested in developing technologies to improve office operations.

He presents the following scenario. A data processing system is installed at a company to compile and generate marketing reports. Armed now with information never before available, the firm's marketing manager develops ideas for market research that require additional data not within the capabilities of the equipment.

Until the system can be upgraded to meet these demands, office workers will be called upon to dig out by hand the information required. "In making his requests, the marketing manager is thinking about ways to generate profits — he's not thinking about clerical costs," Connell said.

The result is low productivity in relation to rising salaries — usually attributed to worker inefficiency and not to the extra workload, he lamented.

Manager: Most Affected

Most impacted by the increasing deluge of office work is the general administrative manager who supervises a large staff and generally takes responsibility for word processing, office services, telecommunications and other functions that involve paper processing.

To keep up with expanding workloads without increasing costs, managers often trim the major office expense — labor, especially if thought to be inefficient.

Studies show that in the labor- and paper-intensive insurance industry, for example, general administrative costs — including salaries, fringe benefits, equipment and supplies — have been rising 15% to 17% per year. Because the volume of new business in the insurance field doesn't approach that figure, companies made cutbacks in those areas, Connell noted.

"Management must recognize that the office workload is a function of more than just increased sales volume," he admonished. Another major contributor to the ever-swelling glut of office work is the paperwork burden imposed on business by government regulators.

These requirements often taxed the capabilities of a standard computer-based payroll and personnel system, he maintained, and as a result armies of workers were commissioned to manually wade through records.

Before computer systems can effectively improve productivity, "We have to recognize that we're shooting at a moving target," Connell said. "A system approach to office operations cannot be justified as a cost-saving measure based on a snapshot of the workload at one point in time."

Because the office workload is not a constant, a manager weighing the economics of computerizing office operations should factor into his numbers an anticipated increase in workload.

To do this, Connell suggests looking back in company history to determine to what extent the workload has expanded in the past. If that increase was, say, 20% per year, his advice is "to build in a little more machinery or more memory to handle another 25%. Otherwise, the cost justification of that computer system won't come true."

ACM to Launch Publication

NEW YORK — A quarterly publication from the Association for Computing Machinery (ACM) will appear in July, with a projected content of 700 pages annually.

ACM Transactions on Programming Languages and Systems (Toplas), with Susan L. Graham as editor-in-chief, will present original work on the development and use of programming languages, methods and systems.

Specific topics to be addressed in the publication will include analysis, experience and usage.

A subscription to Toplas costs $15 for ACM members and $40 for nonmembers. ACM can be reached through P.O. Box 12105, Church St. Station, New York, N.Y. 10249.

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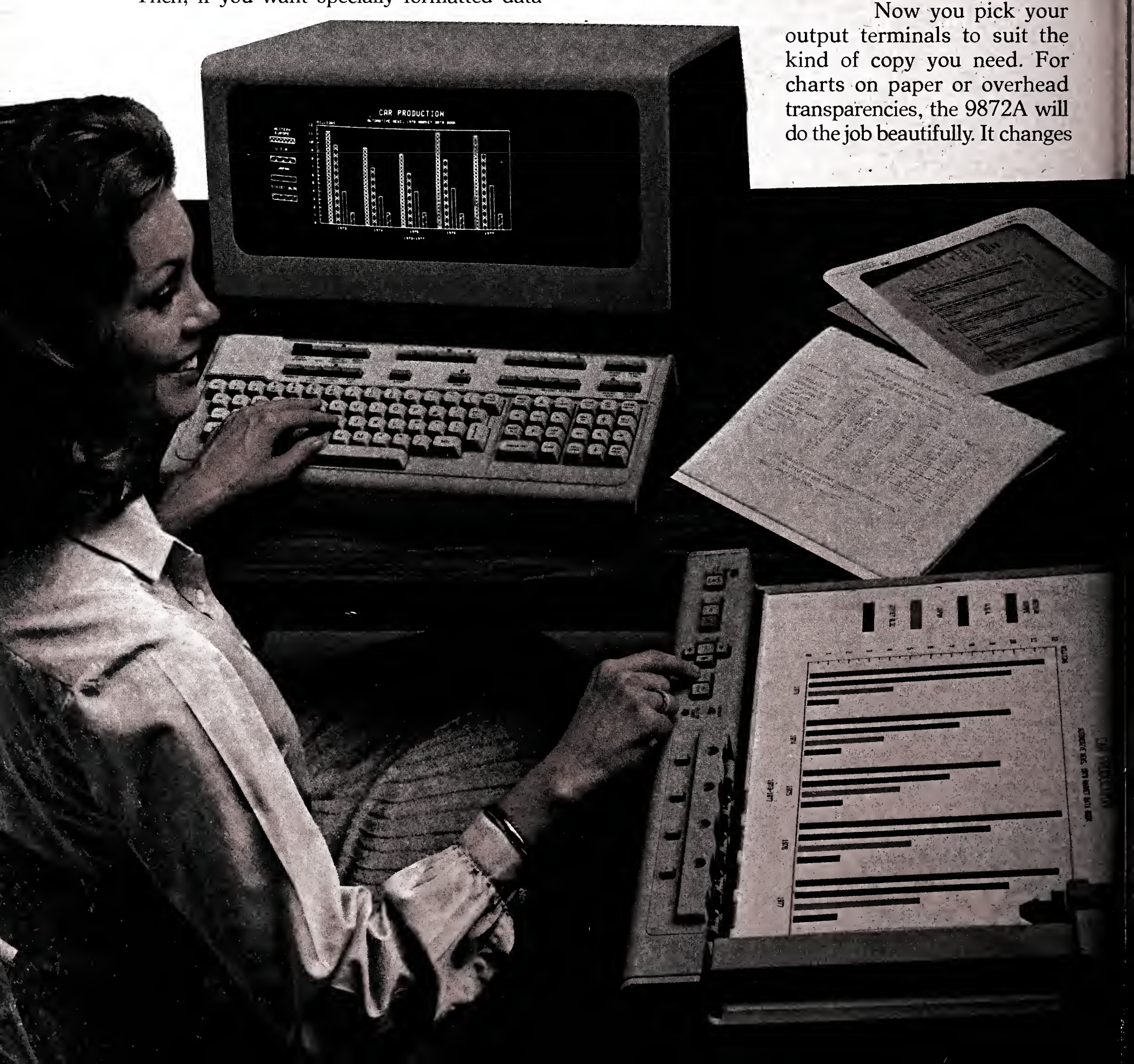

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Computer Scientists Seen Losing Sight of Goal

By Tim Scannell
CW Staff

TORONTO — In the mad rush to develop a bigger and better technological arrow for the information age, computer scientists may have lost sight of their original target.

Although information-oriented hardware and software are developing at a rapid pace and cost/efficiency ratios are at an all-time high, no one really knows what socioeconomic benefits will result from this technological activity, according to Gordon B. Thompson, manager of communications studies at Bell Northern Research in Ottawa.

Speaking here at the recent Data 79 conference, Thompson charged that most companies contact research and develop information-related computer products using one-sided Socratic methods. That is, a company assumes that its particular hypothesis of the way things are is correct and goes out to find a world to test the hypothesis in, Thompson stated.

However, increased computer sales and communications breakthroughs do not necessarily go hand in hand with an understanding of how to best use the technology. Unless planners and computer scientists learn how to organize the technology so that it creates an informational "wealth" at the grass roots level, "we're in for a terrible time," Thompson warned.

The luncheon speaker compared the highly touted information age to the music business and, in particular, to the effects on that business in the '60s of the Beatles.

Although the group created a new sound in music, that sound did not motivate other musicians to try for a different type of music, Thompson said. But it did encourage many people to ride the current wave and copy the same musical beat.

As a result, the music business swelled with singers who, for the most part, did not offer any significant impact.

In much the same way, information technologists, or hardware vendors, abound in the computer industry, but far too few of them are willing to break established patterns and attempt innovative approaches, Thompson pointed out.

Thompson noted that current technologists tend to deal with information and advanced communications as a common public good, basically on the same level as television. However, the two-way communications and video interaction proposed by planners resembles a private good because people are forced to access information through a particular port.

In addition, the output will probably be perceived differently by each person, so it can't be considered a mass-produced product, Thompson said.

Unfortunately, it's hard to develop something as a private economic good when you have absolutely no idea what the technological wrappings will contain. And "it sure as hell won't be sports, news and weather," Thompson stressed. "If I'm going to have alphanumerics plastered all over me, I'd just as soon have something to wrap my fish in."

Scientists Too 'Hung Up'

Cautioning the executive audience to do some "jolly fine research," Thompson recommended making a list of what exactly is needed to develop information technology properly.

To the surprise of his listeners, the communications expert also expressed doubt that any present-day scientists would be responsible for developing this technology as a useful, private product. He urged his audience to look to the children, who are not as "hung up" on the technology.

Finally, he petitioned policy and decision makers to display an increased "sensitivity" in formulating communications laws and in laying the groundwork for the information age.

If we don't get information technology going in the right direction, "we won't be here in 10 years," Thompson predicted. And information scientists and executives will probably end up having "the same kind of convention the tinsmiths have."

Maine Campsite Promotion Aided by On-Line System

NEW YORK — Ticketron, a subsidiary of Control Data Corp., recently started a pilot program for the promotion of Maine's private campgrounds using out-of-state computers.

Under the program, vacationers will be able to buy tickets to reserve sites at private campgrounds in the state through any one of approximately 275 East Coast Ticketron outlets, according to Kurt Devlin, Ticketron's national director of operations here.

Located primarily in retail stores, the Ticketron outlets are equipped with CDC ticket printers and intelligent terminals that communicate with dual 128K-byte CDC Cyber 18-20 computers at the Ticketron data center in Hackensack, N.J.

The remote terminals hook up with the host through a 1,200 bit/sec full duplex polled network with up to 16 terminals per line, Devlin said.

Campground Data Base

For a $1.75 service fee, terminal operators will provide customers with information on a particular campground by accessing a data base that contains an inventory of participating locations.

The on-line system updates the master file inventory as reservations are made, Devlin explained, and campgrounds are notified one to two weeks in advance of unsold sites in Ticketron's allotment.

Ticketron charges campgrounds a $200 one-time programming fee to cover the work involved in creating the inventory file and maintaining other on-line systems, he added.

So far, three private campgrounds in Maine are participating in the program. They are Wassamkisprings in Westbrook and Powderhorn and Old Orchard Beach Camping and Tenting.

DP Conference Aimed at Execs In Benefits Field

LOS ANGELES — For "A Look into the Future of Computers" and an examination of the legal ramifications in DP, executives in the employee benefits field are invited to attend the annual Electronic Data Processing Institute.

Set for Nov. 5-7 at the Biltmore Hotel here, the institute is sponsored by the International Foundation of Employee Benefit Plans.

New computer systems will be demonstrated on-site, and small discussion groups in three advanced and three basic workshops are scheduled for Nov. 7.

The registration fee is $270 for foundation members and $345 for nonmembers. More information is available from the International Foundation of Employee Benefit Plans, P.O. Box 69, Brookfield, Wis. 53005.

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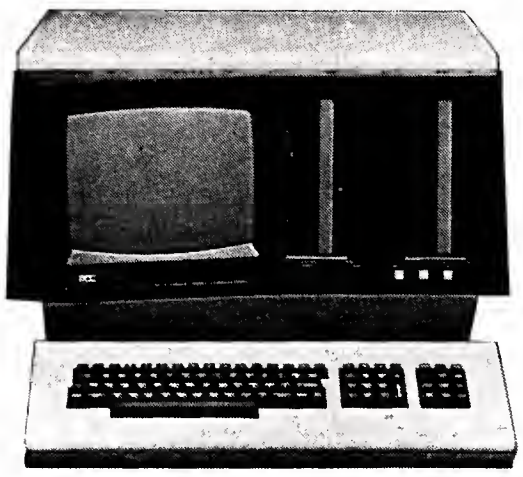

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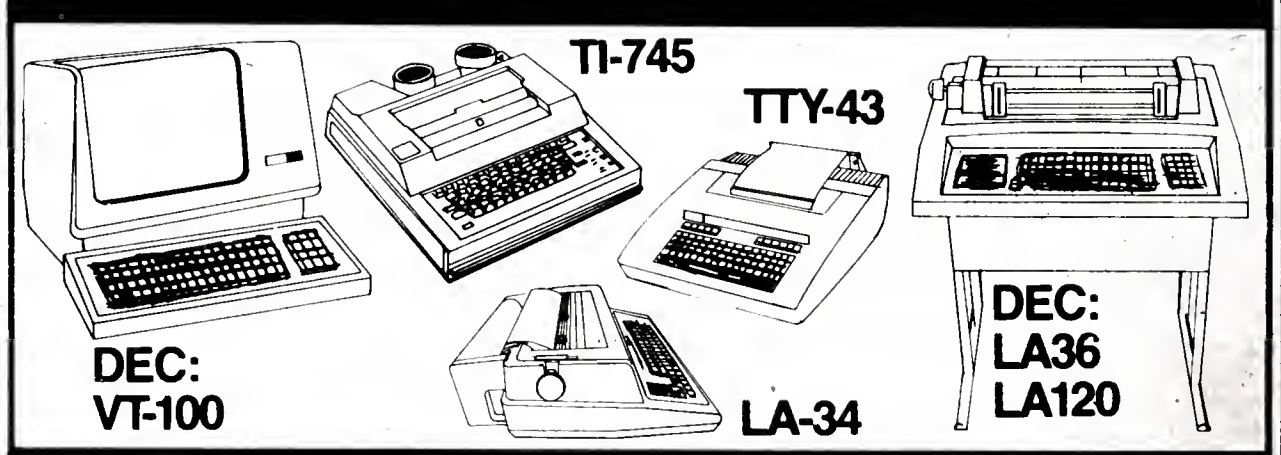

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Big Firms Scramble for Rights

Scientist Creates Color That Can't Be Copied

By Marguerite Zientara
CW Staff

LOS ANGELES — "It's never ever been done before in human history."

That sounds momentous and rightly so. The words, spoken by scientist Marv Oster, describe his successful creation of true dichroic, iridescent colors — an accomplishment that "probably" would have been impossible without the aid of a computer.

"Nature beat us to it by two billion years," Oster reflected, noting that he worked on the process for 12 years and spent more than $100,000 of his own money before he succeeded in manufacturing the fade-proof, nonreproducible colors.

And if the discovery doesn't strike you as momentous, consider that such companies as U.S. Bank Note in Philadelphia, Jeffries Bank Note, Columbia Records, RCA Record Co., MGM and Warner Brothers' record and motion picture companies, Paramount Pictures and Armstrong Cork Co. are competing for the rights to use the process.

Bootlegging, Not Beauty

While Oster's colors have an elusive metallic, shimmery appearance like foil, peacock feathers or butterfly wings, you can bet that the big companies aren't scrambling for rights to beauty. The reason for their interest becomes obvious when you consider that counterfeiting has become a $700 million/year business in the area of record albums alone.

Beyond that, think of the potential uses for "personal authentication and [identification] papers," an area of interest to the CIA or the production of one-valid-copy-only visas, passports and Social Security cards, a possibility for Third-World countries.

With a strip of unique, nonreproducible color attached to such documents (or to record albums), each one becomes distinctive and bootlegging or counterfeiting becomes almost impossible, according to Oster.

Improved Filters

It all started years ago when Oster worked with missiles. "In the control of inertial navigation systems," he explained, "interference filters are used in the tracking mechanism of missiles. The accuracy of the procedure depends on identifying and homing in on a particular band of light from a specific star."

Since the filters have always been "extremely expensive, not very good and not very accurate," Oster noted, "I decided to tackle the problem and spent 12 years on it."

He eventually succeeded in developing workable filters that could be produced at a cost of $1 each with the new process, as compared with $500 each using the original process.

'Paintings' in Demand

While the missile application discovery was certainly a boon to ballistics, Oster still didn't realize what he had. He began producing artwork with the process, in response to a rising demand. "People would try to buy the experiments as art, and we began to realize this is an art form," he said.

Art galleries started asking to exhibit the "paintings" and at one point, 125 people wanted to buy one of the artworks. Over the last nine years, Oster has produced about 120 works, each taking about one week to complete. They have been on display at California Institute of Technology, Yale University, the Chicago Art Institute and the medical complex at University of California at Los Angeles.

When an art gallery owner suggested that Oster "get a good printer" to reproduce the pictures and "make a fortune," the ultimate possibilities hit home.

"My response was, 'That's impossible, don't you understand that there's no way a camera can look at this picture or a printer can make color separations of it?' " Oster recalled. "And then it dawned on me that this would have application to stopping counterfeiting."

The Structure

The reason the colors look metallic and shimmery is because the atoms are organized in the same kinds of highly crystalline patterns as metals, Oster explained. "The process does *not* involve thin films or thin-film phenomena like abalone shell, oil on water, butterfly wings or photographic lens coatings," Oster stressed.

"These are actual three-dimensional structures that are too small to be seen by a light microscope at its highest optical magnification, which would be

(Continued on Page 25)

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Former IEEE Staff Director

Kinn Now Afips Executive Director

John M. Kinn

MONTVALE, N.J. — John M. Kinn has been named executive director for staff activities in the American Federation of Information Processing Societies, Inc. (Afips).

As executive director, Kinn will serve as an officer of the federation with responsibility for the activities of Afips' headquarters here as well as Afips' Arlington, Va., office. In the fall, however, Afips will consolidate its locations and move headquarters to Arlington.

Kinn was most recently staff director for professional services of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and headed its Washington operations.

Kinn succeeds Dr. Robert W. Rector, who is concluding a six-year term with Afips. Rector will remain with Afips through its current fiscal year ending June 30 and work closely with Afips President Dr. Albert S. Hoagland on special assignments.

Kinn has been on the IEEE staff since 1965 and is also a member of a number of other national professional organizations. He holds a bachelor of science degree in electrical engineering.

After obtaining his degree, Kinn worked for Western Electric Co. and from 1954 to 1956 was a group leader on loan to Bell Telephone Laboratories. In 1956, he left the Bell System to join the editorial staff of *Electronics* magazine.

In 1959, he joined the corporate staff at IBM as associate editor of the *IBM Journal of Research and Development* and in 1961 became manager of scientific information.

In 1964, Kinn was named manager of technical information and liaison services at IBM, responsible for coordinating the release of scientific and technical information throughout the corporation. He was also responsible for the operation of the technical liaison committees.

"We are currently considering the possible addition of new publishing activities," Hoagland commented as he announced Kinn's appointment. "In view of this, we are especially happy to be able to obtain Jack's services."

Air Force Plans Portable Centers For Air Control

HANSCOM AFB, Mass. — Transportable radar systems and computer-based operations centers to help military air traffic controllers direct take-offs and landings will soon replace 30-year-old systems at 48 Air Force locations.

Provided by Texas Instruments, Inc. under a $35 million contract, the radar systems will be installed in all 48 locations, while the computer equipment will go only to 12 U.S. and 17 overseas locations, according to Maj. Chris Trytten, program manager.

First models of the equipment, developed by the Electronic Systems Division of the Air Force Systems Command, have been turned over to the Air Training Command at Keesler Air Force Base, Miss. The models will be used to instruct maintenance personnel of the Air Force Communications Service.

In June, the new equipment will begin replacing the old at the other locations, Trytten said. The entire radar complex can be transported by surface vehicle or via C-130 or C-141 aircraft in an emergency, such as a military conflict or a natural disaster that destroys existing airport terminals.

"Because of its age, the equipment we are replacing is becoming more difficult and costly to maintain," Trytten said. Solid-state electronic equipment in the radar will make it cheaper to repair and more reliable to operate.

Each Model 980-B display control computer, with 24K bytes of integrated circuit (IC) chip memory, will control three OD-130 display scopes, which are a modification of the Arts III technology now used in many large U.S. commercial airports.

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Inside the operations center, air traffic controllers normally man three OD-130 airport surveillance radar display consoles, while two more exist for use during heavy flying periods.

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Professional Development Seminars Set at NCC

NEW YORK — A series of 16 one-day Professional Development Seminars will be offered at the New York Sheraton Hotel during the National Computer Conference.

Organized by William A. Baker, assistant vice-president of Aetna Life & Casualty of Hartford, Conn., the series will include 15 one-day tutorial seminars plus a one-day hands-on microcomputer workshop.

To be held June 5-7, the series will address topics "designed to enhance personal and professional skills and aid in career development," according to a spokesman for the sponsor, the American Federation of Information Processing Societies, Inc. (Afips).

The series has been structured to enable attendees to participate in one, two or three consecutive seminars on related subjects. Seminars are grouped under the topics of data base/data communications, mini/micro technology, the automated office, structured methodologies and general topics.

General topics seminars will include a seminar called "Day of Renewal," concerned with management renewal, "Criteria for Selecting Processing Environments" and "Computer Systems Performance."

The fee of $50 for each seminar includes complete course materials plus admission to NCC.

Additional information is available from NCC '79, c/o Afips, 210 Summit Ave., Montvale, N.J. 07645.

Scientist Creates Nonreproducible Colors

(Continued from Page 23)

about 2,000 power," he noted.

The color isn't from dye or pigment, but actually results from the interaction of the small structures with light, causing phase-shifting to occur. "The surface then acquires color," he explained. To change the color, one would have to destroy the structure within the solution.

To produce the colors requires a catalyst, a chemical solution and varying amounts of time. "The solution can be applied to almost anything — photo paper, plastic sheets and cloth — with almost anything — a brush, gauze, surgical needles," he said.

The solutions are completely clear until the catalyst is added, and then "Pow! the colors come right out," Oster said. Each color produced depends on the catalyst and time variables. The colors can be washed with water, causing them to disappear, but when the material dries, the colors will come back he noted.

"It's only in the last year we've gotten the computer to come up with mathematical formulas that confirm the theory of the chemistry," Oster said. Using an IBM System/1 with 5M bytes of memory, a Hewlett-Packard Co. Series 3000 with 64K bytes of memory and an IBM 4973 line printer, he generated mathematical models of "the desired result."

While he could not be more specific because of ongoing negotiations and further scientific work under way on the anticounterfeit application, Oster did call this computer work "unprecedented."

While Oster's primary interest in the colors is scientific, he also sees applications for artists."Through the ages, artists have attempted to capture the look of iridescence or defraction of color — as in a rainbow," he noted, citing the Renaissance painters with their use of gold leaf and Seurat's school of pointillism.

Oster's artworks, however, ultimately became restricted to such things as lunar landscapes and butterfly wings, he said, because people were "rattled quite badly" when they saw portraits done with the iridescent colors. Because the colors are dichroic — red and yellow, for example, do not merge into orange, but remain separate — there is no merging of retinal response, which "bothers some people," he noted.

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EDITORIAL

Moving Up

One of the oldest saws in the computer community is that DPers need to begin thinking like businesspeople rather than technicians if they wish to move up the corporate ladder.

Two recent profiles in *Computerworld* — of DuWayne Peterson of Security Pacific National Bank [CW, April 16] and Edward Lustig of Occidental Petroleum Corp. [CW, May 14] — show that DPers who think like businesspeople can and are moving up in their corporations.

The trend is welcome. The manager of an organization's information resources *can* be an important part of top corporate management if he can express the goals of information resource management in terms top management can understand.

And those are the terms of business, not technology.

Clearly, the manager who wishes to make the move up the corporate ladder needs to understand the technology of computing, but more important is an understanding of how computing technology can contribute to the overall goals of an organization.

The person who can help fit computing into those goals and can anticipate trends and developments both within the world of DP and within the business itself is clearly a candidate for the highest management positions.

After all, the manager of information resources is one of the few corporate officers who will have a broad view of the corporation as a whole. He will interface with all operational units in a company and will need to understand their goals. Such a person should not be merely a technician, but also a broad-based businessperson, leading and educating users about the potential for DP and its effective uses.

The manager who can combine the DP know-how with management philosophy and goals clearly has an unlimited future.

But while this trend should continue, not all DPers will be able — or should even necessarily try — to follow the same path.

DP-knowledgeable people are needed in the top ranks of management, but there is an equal need for technicians in the trenches. Just as not every good salesperson is suited for a sales management position, not every good DPer is suited for a general management job.

The trick — and the difficulty — is for individuals to realize their strengths and weaknesses.

The rewards might be greater in management, but not all DPers should strive for that just for the rewards alone.

People must decide what they do best and clearly know their limitations or they may end up as square pegs in round holes.

DATA PAST

Five Years Ago
May 22, 1974

OKLAHOMA CITY, Okla. — IBM and Telex Corp. essentially traded past arguments in this industry oil town during what was probably the last stop in their two-year-old litigation. IBM told the Tenth Circuit Court of Appeals that a lower court verdict which found IBM guilty of monopolization could not be supported by the facts in the case and should be reversed. Telex argued that the lower court finding was correct, but that the penalty levied against IBM should be even larger than the $259.5 million awarded.

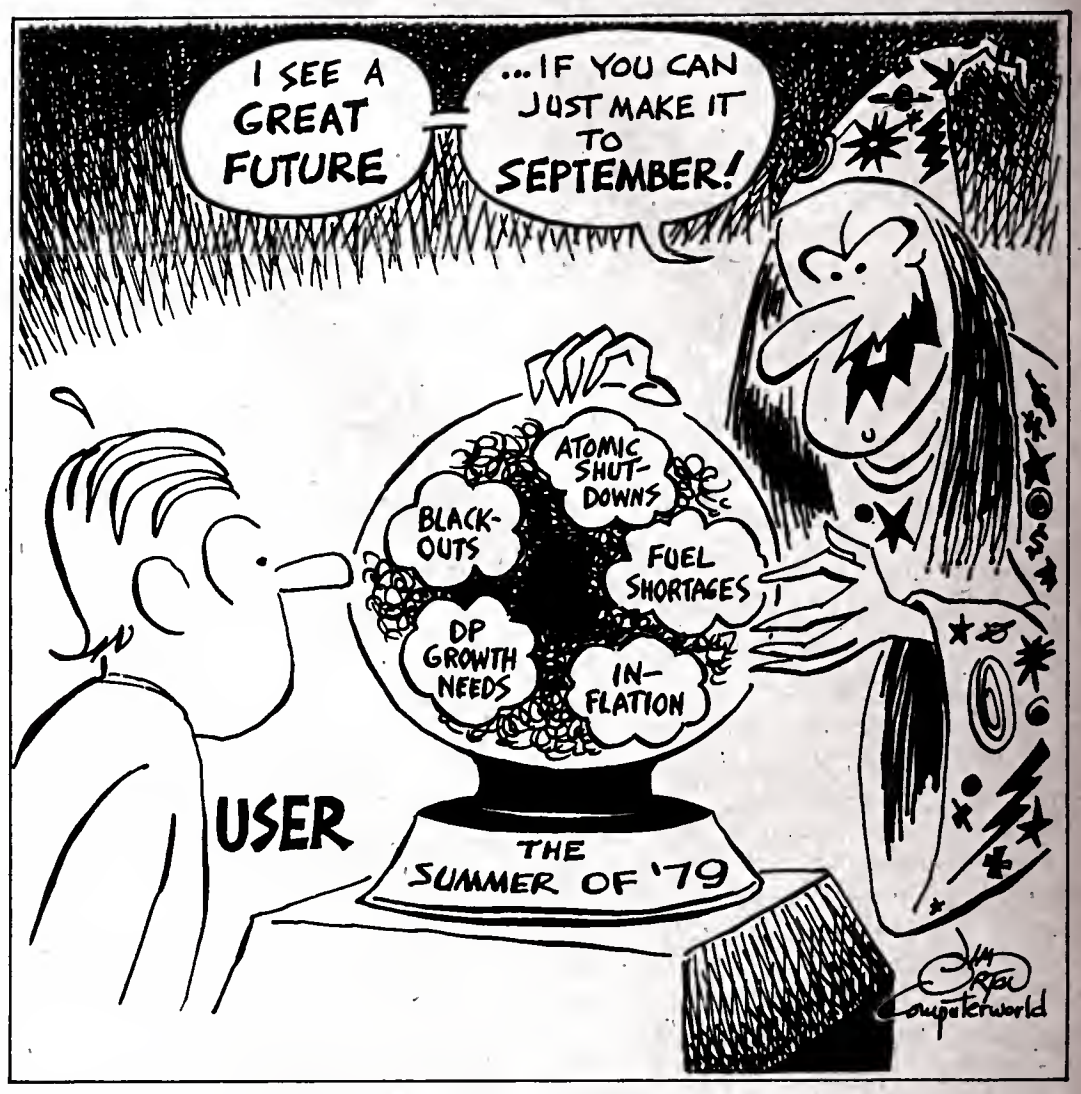
— — —

SACRAMENTO, Calif. — The state attorney general began a $5.2 million program to purge certain criminal files maintained by the California Department of Justice (DOJ). It was expected that the purge would reduce the files by about 50% and that other law enforcement agencies in the state would start similar programs.

Eight Years Ago
May 26, 1971

ATLANTIC CITY, N.J. — Sen. Sam J. Ervin Jr. (D-N.C.) said computer people have accepted a "special responsibility for the preservation of liberty" in the U.S. and must deter government from computer applications that might "adversely" affect constitutional rights.

Ervin told some 800 attendees at the Spring Joint Computer Conference that DPers must continue to make known the restrictions and limitations of computers.



LETTERS

Warning to Payroll Users

This is a call to arms for all payroll users (and that covers just about everybody, right?). While battles have been raging over the impact of the nine-digit Zip Code on current systems, the government has slipped in a radical change in payroll regulations that will affect virtually every payroll system in existence, and it goes into effect in less than two months. Are you ready for it?

Briefly, a new type of negative withholding has been created for low-income employees who may be eligible for the Earned Income Credit on their federal tax returns. This type of withholding is *added* to the employee's pay instead of being subtracted (it's called an "advance EIC payment").

Not only does this mean a new calculation routine and an additional tax table for figuring employee pay, but it also has to appear as a separate figure on the employer's Form 941 (it's subtracted from what he owes) and on each employee's W-2 form.

In addition, you can throw out all the checks you have in stock now since this figure will have to be added to your check stub format.

Not only will this mean a major reprogramming effort for all payroll programs, but new programs will have to be written to convert existing files to the new formats. Manuals, file layouts, specifications and so forth will have to be changed — soon! I think it's unnecessary.

Why can't the government just lower the current withholding rates for lower income people or give them extra exemption credits? Why leave the current rates the same and then offset them with a credit when it can be done more simply?

Has anyone in government really looked at what it will cost to make this conversion effort and whether it can be justified?

Write or telegram your congressman now. If nothing is done, the regulation goes into effect on June 30. There is no time to waste.

John White
Fresno, Calif.

Points on Query Facility

I would like to clarify a few points made in the article on the new release of our On-Line Query facility for use with IDMS [CW, May 7]. The On-Line Query facility, both Version 1.0 and Version 2.0, accesses IDMS data bases. Sophisticated search paths using primary and secondary indexes and following many data relationships defined to IDMS were available in the first release. The ability to define these search paths in a *single* command set with unlimited Boolean selection criteria is now present in the new release.

Second, On-Line Query 1.0 and now 2.0 run under all IBM operating systems, including OS 360, MFT and MVT. The On-Line Query facility is reentrant and multithreaded and operates as a task under the control of the IDMS Central Version.

Efficient interfaces are available for On-Line Query use through all popular teleprocessing monitors including IDMS-DC, CICS, TSO, CMS, Shadow, Intercomm, Taskmaster and Westi. The new release is already installed in approximately 50 of the 500 sites in which IDMS is installed and is scheduled to replace On-Line Query Version 1.0 in an additional 200 sites.

Thomas F. Meurer
Senior Vice-President
Data Base Products
Cullinane Corp.
Wellesley, Mass.

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

THE TAYLOR REPORT/Alan Taylor

TRS-80 Takes Big Strides in Software, Upkeep

About six months after Radio Shack announced its $600 personal computer, the TRS-80, the development was covered in these columns with some warning notes as to its impact [CW, May 8 and July 24, 1978].

The TRS-80 was a potential turning point in the general progress of computers, equivalent to the point 20 years ago when the decision was made to use a standard language for English language business programming. That decision in 1959, which led to Cobol, certainly has affected business programming throughout the world. To put the announcement of a ham-radio chain (as most of us regarded Radio Shack at that time) on this level seemed ridiculous.

But now the picture has changed. Radio Shack does not talk about deliveries, but information from inside the planning departments of the major manufacturers indicates that 100,000 TRS-80s and another 100,000 compatible units are being used. At this rate of growth, what will the figures be next year?

In the past year, progress in the TRS-80 field was approximately equivalent to that of business computers from 1957 to 1967. In as little as two or three years, the two fields may be nudging each other forward.

Hardware Progress

Hardware has progressed, of course. The top-of-the-line business version of the TRS-80 itself costs nearly $5,000 with two disks and printer. The early connection methods are here and will soon make the terminal mode of operation normal for the TRS-80.

And the low-cost minimum system is not being ignored, with the new $219 printer the company is offering. It outputs upper and lower case characters at 120 line/min, 32 char./line.

A DP school with very curious advertising is about to graduate its first programmers . . . and that is posing a professional problem that will be discussed in next week's Taylor Report.

There is real progress from Fort Worth. But that is probably not the *real* hardware news.

The real news is that hardware progress is being made by dozens — perhaps hundreds — of hardware vendors who can afford to test their products properly because they all have TRS-80 configurations against which to test. And, they have to go one (or two) better than Radio Shack to sell.

So the offerings already include disk systems ready to hold 1M byte, tape systems nearly as fast as the diskettes and memory systems that provide 200-nsec speed to those who can use it.

In contrast, it was not until the late 1960s that anything like such a variety of systems was available to users from the independents. And, also in contrast, Radio Shack is not fighting these suppliers. It doesn't maintain their products, but it doesn't refuse to maintain its own equipment if it is connected to the independent products.

Maintenance Policy

The maintenance policies and capabilities are, of course, paramount in whether this is to be a useful system or a toy. Radio Shack has been setting up walk-in centers and provides maintenance at standard rates.

Most repairs cost less than $25 unless mechanical systems such as disks are involved. Then, the charge is based on hourly labor rates plus parts. Rates are about one-third those currently being charged by the big manufacturers, and the replaced parts remain the property

(Continued on Page 32)

COMMENTARY/ Connie Winkler

IBM Trial: Justice's Vietnam?

The IBM trial is the Justice Department Antitrust Division's Vietnam, Robert Bork said at a Time magazine seminar on antitrust in Washington, D.C., last week. Bork is a former Solicitor General, now a Yale law professor.

As the trial begins its fifth year this week (May 19), it's timely to consider the Vietnam idea. What is going on with U.S. vs. IBM?

Over the past four years, the trial has run sporadically 613 days, filled 90,000 pages of transcript and heard 52 government witnesses and 19 IBM witnesses. IBM began its defense a year ago April 26.

Whereas the trial was clipping along at the beginning of this year, it has stalled during the past month as Judge David N. Edelstein grapples with major motions from the government requesting more documents from IBM. Tension between the two sides is greater than ever. The parties seem less able to resolve minor points and, instead, dump their disputes in the judge's lap.

But has the trial reached a Vietnam-type stalemate — where no side really wins but one side overcomes? Is U.S. vs. IBM Vietnam revisited?

IBM counsel Thomas D. Barr — "field marshal," as slick magazines like to call him — likes the Vietnam analogy and apparently sees himself marching into Saigon soon. "Me and my little guerrilla army," he quips.

Flawed Analogy

But that's where the Vietnam analogy breaks down. Barr hardly heads up a guerrilla force. IBM's Wall Street law firm, Cravath, Swaine & Moore, backed by IBM's litigation support team, is more like the Pentagon. Like the U.S. fighting forces in Vietnam, the IBM defense team is supplied and supported to the hilt with all the help IBM's DP expertise can provide.

Dark-suited, white-shirted, the IBMers march into court bringing boxes and boxes of documents and materials connected with the case. Besides the Cravath lawyers — usually three — there are always three support

(Continued on Page 32)

HUMAN CONNECTION Jack Stone

Management Should Attend To Employee Development

Too often, DP employee development programs smack of public relations fantasies.

Let me note a few: offering "rewards" to performing programmer/analysts in the form of the free five-day cocktail party at doubtful user group meetings; providing a benevolent "education" program for operators that lets them watch MVS films on their 10-minute breaks; giving the junior analyst "experience" by assigning her to the user who is the chronic complainer; indoctrinating the systems programmer new hire into the company on his first day by giving him a guide to medical benefits claims as he is shown the backlog of systems dumps; elevating those who are most "buddy-buddy" with the DP manager; finding sinecures for poor performers, instead of firing them; promoting people into "professional" positions to avoid overtime compensation; and holding out the carrot of a programmer trainee slot to an unqualified operator.

Evidence of widespread disaffection with employee development programs is legion.

Even the mighty IBM, which is known for its sterling abilities to find gobs of talent and build them for all they're worth, is not exempt from occasional personnel failures (for example, as alleged in my column, "Do DP Managers Delay, Suppress Transfers?" [CW, March 26]). In fact, for this column, I have chosen another story about IBM to illustrate a fundamental point about employee programs.

And no, Frank Cary, I'm not picking on IBM because it's fashionable to do so by certain industry writers, but only because the revelation of a small chink in IBM's personnel armor drives my point home so forcefully.

Employee's Perspective

The point I want to make is this: Before implementation of a development program, management should think through — very, very carefully — how the employee will feel and respond to it, every step along the way. Too frequently, what may be considered well-intentioned by management is viewed altogether differently by the employee. And the end result, instead of drawing the employee closer to the bosom of the firm, may actually send the person racing out the door!

For years, IBM has operated a program of personnel transfers from its domestic to its international operations. The transfer is for two to three years, recognizing that there are needs for management and technical skills that can't be met overseas.

The job is viewed as a real plum by the employee selected. It's a significant step on the career path, the money is

(Continued on Page 32)

the hexadecimal kid and his faithful dog ascii

A FANTASY IN SIXTEEN BITS

by Richard Forsyth

BIT 3
(A BIT OF LUCK)

Simula and the Hexadecimal Kid have been trapped by Dr. Null, who is bent on destroying civilization by corrupting the Data Base. He is threatening to starve them of data unless they agree to work for him. Simula is near exhaustion. Her symbol tables are nearly full and her runtime stack will soon overflow.

"He's got a point, you know," Simula said to Hex. "I'm ravenous: I could eat a megabyte."

"You shall have your fill as soon as you persuade the Kid to assist me," Dr. Null said.

As Dr. Null was gloating at Simula, Hex noticed two familiar figures creeping stealthily into view. It was the terrible twins, Fetch and Execute, his robot assistants.

Suddenly, they lept on Dr. Null from behind, bringing him down. Fetch bound his hands tightly with mag tape while Execute thumped him over the head with a roll of teletype paper.

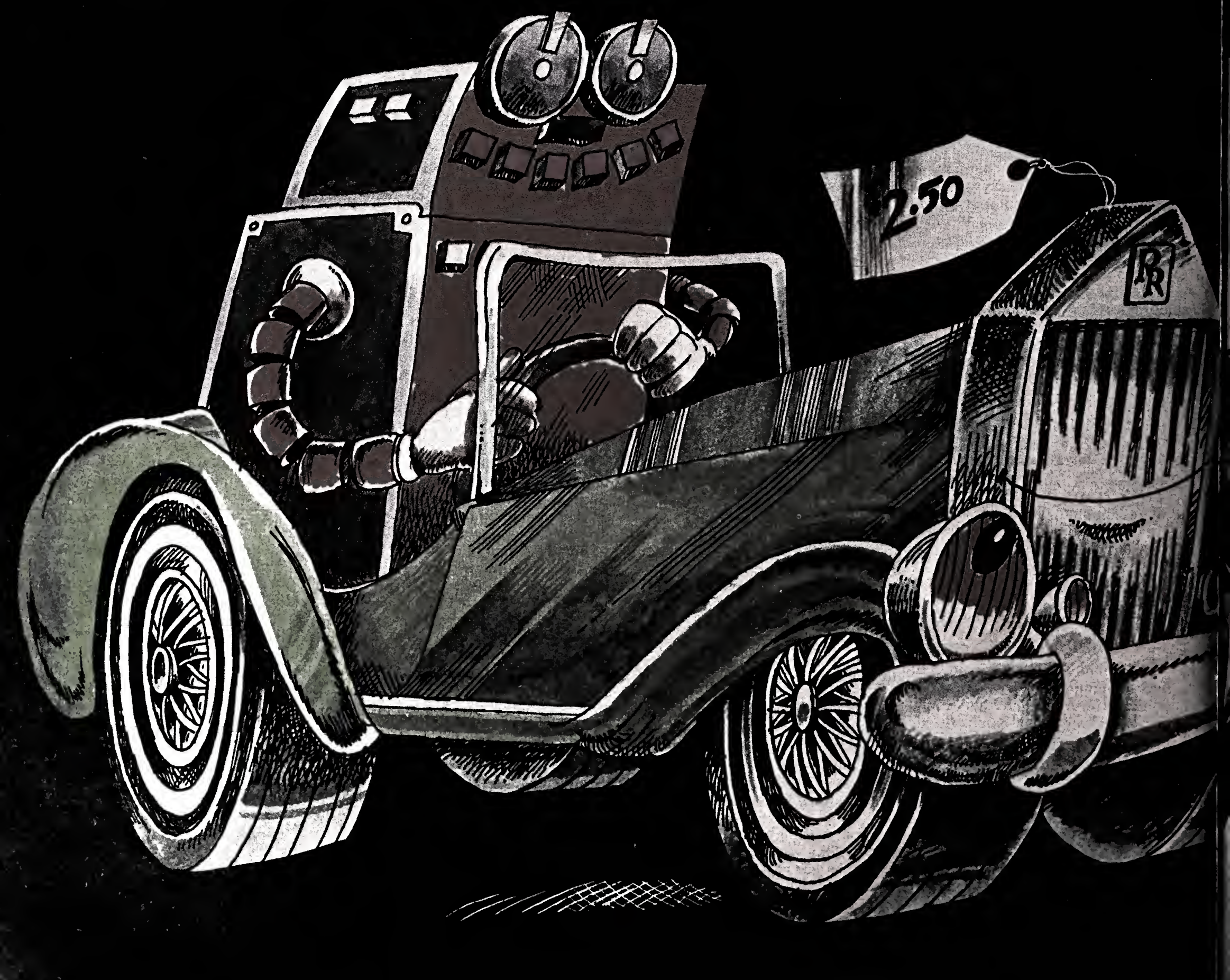
"Good work!" Hex exclaimed. Then he sprang towards Simula, who had crumpled onto the floor. "She's fainted," he cried in alarm, hoping that the creature had not had time to use his confounded device. Quickly he tore the necklace off her and flung it away.

"Speak to her in Algol," Fetch suggested, "It's her mother tongue." Fetch had left Execute to deal with Dr. Null.

Hex began speaking steadily and clearly.

(Continued on Page 30)

"If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost $2.50 and get 2,000,000 miles per gallon."



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We are CW Communications/Inc. and despite our youth (we'll be 12 this year) we're the world's largest publisher of newspapers and magazines for computer people all over the world.

Most of our publications are weekly newspapers, because so many things happen so rapidly in the computer business (as the headline quote from a prominent industry executive makes so clear).

In only thirty years the industry has gone from the development of the giant Eniac system, through the tube-powered, water-cooled Univac I (the world's first business computer), to the incredibly cheap, battery-powered microprocessor.

But as unbelievable as the last 30 years have been, the next 30 will probably be even more incredible. Right now, IBM has begun delivery of a new computer series that will, by itself, provide four times as much processing power as all the previous computers delivered by the company. And they have announced a new "superconductor" that could improve computer speed and performance by a factor of 500 in the next seven years! It's hard to remember this is real science, not fiction.

This extraordinary increase in efficiency has led to a rapid expansion in computer use, as human ingenuity finds more and more applications for these powerful tools. So the market for computer products and services has turned out to be more elastic than most observers had thought. Worldwide expenditures are currently at $75 Billion, and growing by 20% a year.

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(quite an increase from our modest 7,500 in 1967). *COMPUTERWORLD* serves America's computer users with the consumer-oriented, objective information they need.

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Hex and Friends Stop Dr. Null — For Now

(Continued from Page 27)

```
"begin integer Level;
comment I hope she can still compile this; procedure TEST (I); integer I; value I; begin integer array Q [0:1];
 PRINT (I,4,0); NEWLINE(1);
 Q[I]: = I; TEST (I+1];
end of TEST;
Level: = 0;
TEST ( Level );
end of main program;
$LOADGO"
```

"It's an old trick," Fetch said.

"But it just might work," Execute added. He had left Dr. Null safely trussed up and came over to join them. They stared intently at her. After what seemed like an age, Simula stirred. Her eyes did not open, but they could just catch her weak voice saying:

```
"ALGOL COMPILATION:
0 ERRORS DETECTED.
LOADING . . ."
```

There was a breathless hush.

```
"EXECUTION:
 0
 1
??FATAL RUNTIME ERROR. JOB ABORTED. SUBSCRIPT OUT OF RANGE IN PROCEDURE TEST."
```

They let out a cheer.

"I think she's going to be all right." Hex said. "You two had better guard our prisoner for the moment. I'll link her to the Data Base without any further delay."

She was regaining consciousness now. Hex led her gently toward the terminal, sat her down and logged in for her. Fortunately (though it was against the rules) they knew each other's passwords.

As the data began to flow again, the color returned to her cheeks. She looked up at him and smiled. "Thanks, Hex"

Hex had an almost biological sense of elation. He did not so much walk, as float, to where Fetch and Execute were bending over the prostrate figure of their unwelcome guest.

"What shall we do with this creature?" Fetch asked.

"Turn him over to the Error Squad," Hex replied. "They can either try to dehumanize him or, if that fails, he can be sent back to a reservation."

"Surely it would save resources just to kill him here and now," Execute proposed.

"No," the Kid said, "he's no longer a threat; and we have no authority to kill people except in self-defense: that would make us little better than them. The best idea is to wait till I've repaired Ascii and then escort him to the nearest remote entry station. Those bionic teeth will make him think twice about trying to escape on the way."

"Okay," Fetch agreed, "but we had better notify the Error Squad first that we have picked up a runaway human. He may be on their wanted list."

"Right," Hex said. "You do that while Execute comes with me to fix up poor old Ascii."

They found Ascii where he had fallen. Hex plugged in a spare 64K memory chip, and Execute performed the hardware diagnostic tests. It took much less time than Hex had expected before Ascii was happily wagging his data cassette again.

"You're a tough old dog," Hex said to him with pride.

At that moment, Simula burst in, waving a torn-off piece of line printer paper. "You must see this," she cried excitedly. "It's sensational."

"While I was updating my files," she told them, "I thought I might as well find out some more about our visitor. So I put in a data base interrogation request: This is what I got back."

What has Simula found out about Dr. Null?

Did you spot the deliberate mistake?

Don't miss the next bit!

Forsyth is a software manager for RAIR Timesharing in the UK.

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LETTERS

It's Here to Stay

With due respect to Clyde Miller's views [CW letter, April 23], it still looks to me as if the structured revolution is here to stay. The original intent of the movement is often forgotten. And the basic tenets are sometimes emotionally touted as self-evident. The desired change in the programming profession will not be accomplished by such means.

Such presentations of the method are disconnected from the roots of the method. The results will probably die like cut flowers.

Appropos the concern for efficiency or program size: I can only ask if you have noticed the trends in the hardware costs and people costs of DP.

The original purpose of structured design or programming was certainly not to create the mountains of paper that appear to result. Nor was it a witch hunt after users of the GO TO.

The goal was to create clear programs with the smallest tool kit possible. It is really unfortunate how this is presented by some, how hard it seems to do this in Cobol and how few really try to understand the nested IF and so forth.

But it will undoubtedly succeed. Take a look at the training new programmers are getting these days. Do the rest of us realize what prehistoric creatures we look like? Take another good look at structured programming. The day is coming when we either produce correctly working and maintainable programs in a fraction of the time we used to or sink in our tar-pits.

P. Namtvedt
Madison, Wis.

Sound Solution

"Maybe you don't need more programmers" [CW, April 16] seemed to ignore in its presentation a sound solution which involves senior DP management. The nonproductive areas can readily be solved by the application and enforced adherence to the following methods:

1: Establish proper communication lines. In so doing, the users will quickly come to recognize that their answers may be quickly forthcoming if they direct their questions to the most appropriate individual.

In regard to questions of a systems or programming nature, all queries should be addressed to either the manager of systems and programming and/or a systems analyst whose function would then evolve into the updating of necessary documentation to reflect his answer. Or if this documentation is not lacking, a suggestion to the user that he familiarize himself with written procedures would be preferable.

On the part of queries of an operational nature, the manager of operations should be addressed and part of his function would be to educate the user as to the appreciation of schedules and of scheduling.

2. Establish proper testing procedures to the point that a trained operator can perform the test function by following well-written instructions. There should be no need at all for "hands on" if a programmer is systematic in his approach.

3. The proper use of individuals within a DP department can alleviate many problems.

In regard to the clerical support specialists, all you have defined is a secretary, part of whose responsibilities should be proper maintenance of program listings, filings, writing memos and so forth.

It is essential that today's DP management recognize that allowing scattered input to its employees will result in scattered output and the inability to perform well.

Arni Cohn
St. Laurent, Quebec

Not a CRT

In the April 9 issue of *Computerworld*, the article on "Linda and Brian: Logged on for Life" stated that the terminal was a CRT. Please note that they used a Texas Instruments, Inc. Silent 700 Model 763. One look at the picture that accompanied the article and one could see the distinction.

Ken Price
Advertising-Merchandising Director
Texas Instruments, Inc.
Houston, Texas

Hiding Place for NCR

In response to "NCR Haggling Over 'Fixed Price' Gear" [CW, March 12], NCR Corp. users who attended the annual national NCR user conference in Denver April 22-25 confronted G.P. Williamson, NCR vice-president, for clarification on "special deals."

Williamson, who wrote the now infamous internal memo spelling out NCR's method of meeting competition by obtaining copies of competitive bids to establish a counteroffer, said that such methods were used on older Century or used equipment.

That is an interesting response in view of the facts that:

- The infamous memo addressed a user with a Criterion 8450 computer.
- The Criterion user did in fact receive a competitive counteroffer from NCR far below list price.
- Many other Criterion users have played Williamson's game of "show me yours and I'll show you mine" and won their "special deal."

Come, come, Williamson. You will have to find another corner to hide in; this one is already occupied by other NCR executives.

G. Cimo
President
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TRS-80 Makes Big Progress in Its First Year

(Continued from Page 27)

of the user and don't become the spoils of the service man. Service contracts are available, too, provided that no part of the system is non-Radio Shack.

The accessibility of the repair centers is growing. More than 50 are in operation so far, and about 120 service places will be ready by July, according to plans. The center closest to me is about 10 miles away, and I don't think I'm unusual.

Turnaround is normally 24 hours, and parts are shipped by air from Fort Worth if not in stock.

Different Software, Too

The Radio Shack philosophy in maintenance — keeping prices in tune with product costs — is also having an effect in the software. Here, the company cannot afford personal software education for every customer. The software itself must train (with the documentation), and this is built into the specifications and into the policy of use.

Radio Shack does not use the machine code for the application programs (about 30 are now available, with more coming). Although machine code is faster, it makes modification impossible for most users. So Radio Shack uses Basic and lets the user have the source code as part of the contract. He can modify it to meet his own needs, use it as is or call upon the services of many systems analysts to give him the changes he needs.

And there are plenty of analysts ready, too — not from the vendor, but from the base of TRS-80 and other Basic-based system users. There must be thousands of them who have their own system and so can write and modify programs and software in a way never before possible. Before this, only companies, not programmers, could possibly own computers.

This change is probably the source of much of the tremendous software progress.

For instance, Teach Yourself by Computer Software in Genesco, N.Y., offers Mind, a program with advancing levels of logic and interfaced with mnemonics to help people learn not merely the particular subject, but even the psychological principles upon which the program itself is based.

It works on the minimum TRS-80 system and is usable by children although designed for adults. The first Mind Step teaches techniques for remembering lists and so forth and costs $25. If you want to learn more difficult matter, you have to pay more — a full $29.95 for Mind Step II.

Or perhaps you would like to learn the constellations of the night sky or see how they would look from a planet circling any of the stars?

Other available programs deal with biorhythms, checkbook balancing, archeology, music making and many other purely personal software needs. All are being supplied by programmers and analysts with their own machines.

This is not to say that reproductions of the normal business software are not appearing. They are, and in quantity and against good competition. Generating systems, text editing, payroll, accounts and full inventory control systems are all here — only 18 months after announcement of the TRS-80!

Communications systems are conspicuous by their absence so far, but if that gap isn't filled within six months, I'll eat my hat.

In short, any doubts as to the importance of the TRS-80 have been resolved by a year's spectacular progress and by the development of whole new areas of useful software. But so far, we have seen just a beginning of what personal computers can offer to DP as a whole.

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Worker Programs Lacking

(Continued from Page 27)

fine (what with the special allowances plus base salary) and there's the great opportunity for foreign travel. What a deal!

Plus, there's a guaranteed return to the states. But alas, there's the rub, and the employee doesn't really find it out until he or she starts planning "reentry." Then the euphoria evaporates.

In the words of one IBM transferee I recently interviewed:

"The guarantee means return to the old department and the old manager, if the person's still around. But it's not a guarantee of a job in your line — a point I was led to believe was not a problem at reentry time.

"What really makes it very difficult is the practice wherein the manager is your career promoter and is even measured, in part, on the number of promotions out of the department. This was fine when I was in the U.S., but my overseas manager, though well-meaning, did not have the contacts in the U.S. to really help me get placed.

"So, if you can imagine it, I had to do the placement myself! I was forced to reestablish contacts I had in IBM-U.S., which was not easy for me to do from an overseas location, nor appreciated since I was paying for the phone calls.

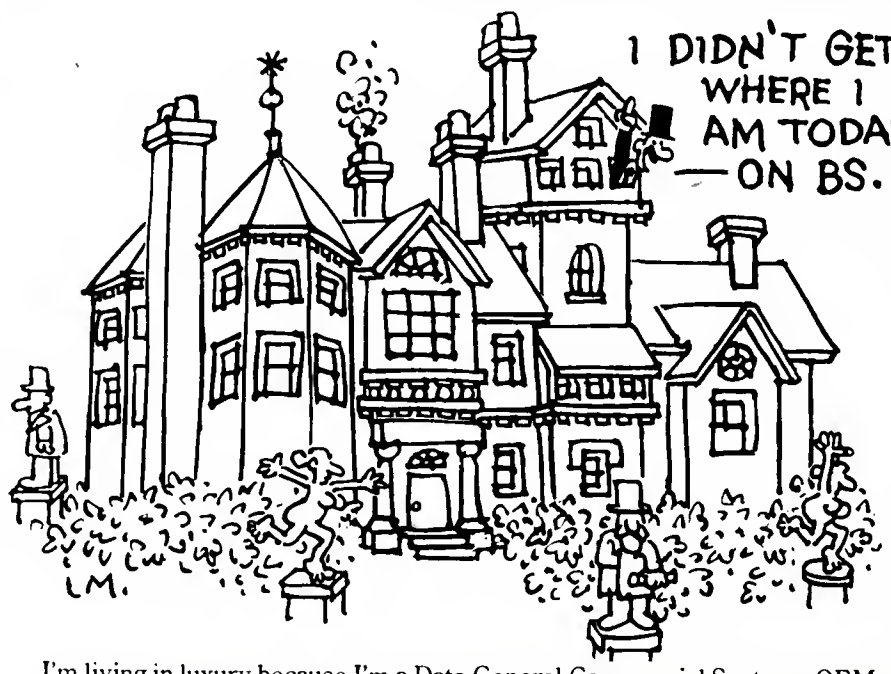
"As you might expect, my old manager was long since transferred, there was a hiring freeze and, after failing to find anything really significant, I became desperate and had to settle for a job which used about a quarter of my skills.

"The incident was a very unhappy one. My prior image of IBM was tarnished beyond repair. I felt seriously abandoned and embarrassed that I had to sell myself on the telephone to people I didn't know. I was angry that I had a substantial setback in my career.

"We who were given these overseas assignments viewed ourselves as a high-flying, elite group. Many of us were on a corporate list of candidates for future executive posts. Nearly all had reentry problems.

"I was dismayed at IBM management! Are these the people into whose hands I want to place my professional career? The answer for me was obviously no, because sometime later, I left IBM for a position with another firm."

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.



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IBM Trial Like Vietnam?

(Continued from Page 27)

men and have been as many as 12.

It's the government team which operates haphazardly and on a small budget in a manner that can only be described as guerrilla. The government brings fewer boxes into court and no government support people wear suits and white shirts. Usually, only one paralegal babysits for the government documents.

Six blocks from the Foley Square courthouse, hundreds of IBM employees are working in direct support of those in the courtroom. IBM took over the entire floor of a downtown New York City office building. In White Plains, N.Y., hundreds more IBMers methodically microfilm all the transcripts and exhibits and catalog every word for computer retrieval.

The government's trial team works on two half-floors in a federal office building adjacent to the courthouse. Cardboard boxes are everywhere and only in the last several years has the government started using DP to track the millions of documents in this case.

So as the trial begins its fifth year Saturday, the real question may not be whether it's Vietnam revisited, but who is the Pentagon and who are the guerrillas.

Winkler is a CW staff writer.

Documentation Study Proves Utility of Program Listings

By G.E. Anderson
And K.C. Shumate
Special to CW

CAMP PENDLETON, Calif. — A study conducted at the Marine Corps Tactical Systems Support Activity (MCTSSA) here evaluated six software documentation tools.

MCTSSA is the research and development center for the U.S. Marine Corps on the West Coast, and one of its jobs is to perform software maintenance for all real-time, tactical computer programs in the corps. Because of the importance and the long life of these programs, factors such as program "readability" and "modificability" are as important as ease of system development. The requirement for modification of these programs can result in life-cycle costs as great as three or four times the development cost.

Like many computing installations, MCTSSA has become concerned about the high cost of maintaining software and procuring software documentation. In fact, to make tactical software more "maintainable," the Marine Corps often spends as much for software documentation as it does on the tactical computer programs themselves.

Is this money being spent wisely? Are maintenance programmers using these documentation tools? Where should the emphasis be placed?

Programmers Surveyed

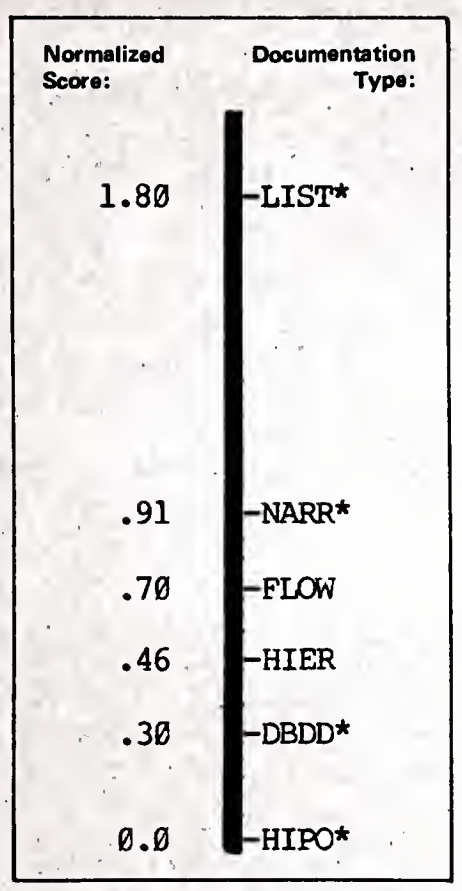
To find out which software documentation tools were actually bring used, 18 maintenance programmers were surveyed. These moderately experienced programmers work with embedded (militarized) computer systems which provide real-time command and control of aircraft for the Marine Corps.

Approximately 90% of the code they maintain is written in a high-order language called CMS-2, and the remaining 10% is written in assembly language.

The 18 programmers were asked to rank six software documentation tools:

1. The Data Base Design Document (DBDD) which contains descriptions and pictorial representations of all program data structures.
2. Ansi flowcharts (Flow) as widely used in DP.
3. Hierarchy Diagrams (Hier), which show the calling hierarchy of a program similar to an organization chart.
4. Hierarchical-Input-Processing-Output Charts (Hipo) as widely used in DP.
5. Computer Program Listings (List), which at MCTSSA provide interspersed CMS-2 source

(Continued on Page 37)



Variation from average scores on starred items are significant beyond .90 level.

Itel Chops VM Overhead on 7031

SAN FRANCISCO — A microcode package now available from Itel Corp. boosts the CPU internal performance of Itel AS/7031s running under IBM's Virtual Machine facility (VM/370) by as much as 35%, according to an Itel spokesman.

The Extended Virtual Machine (EVM) firmware is able to provide that degree of improvement, he said, because it reduces the overhead normally associated with VM/370 by as much as 40% to 60%. Itel AS/7031s using VM/370 and EVM now have an internal performance better than that of an IBM 3031, the company claimed.

Even though VM/370 can be used on other Itel mainframes, the spokesman emphasized that EVM is only available for the AS/7031, which is Itel's plug-compatible counterpart to the IBM 3031.

The claims are based on various benchmarks Itel ran with results documented by both hardware monitoring and VM accounting data records, the spokesman maintained. He admitted, however, that the degree of improvement available to a a user would depend very heavily on the actual operating system being used under VM/370. MVS users would tend to benefit most, whereas CMS users — working with a system that is already well-tuned to VM/370 — would gain less with EVM.

Putting his thoughts another way, he said operations with a high degree of multiprogramming and a high level of I/O would tend to gain the most from the firmware assist.

EVM: Three Components

Likening EVM to the portion of IBM's Extended Control Program Support (ECPS) that supports VM/370 on a 370/148, he said EVM has three components. The Extended Virtual Machine Assist component extends the microcode support to privileged instructions executing in a virtual machine.

The Control Program Assist component extends the micro-used Control Program functions

(Continued on Page 38)

Unix Adapted to 11/70 and VAX

NEW YORK — The Unix multiuser, interactive operating system devised by Western Electric Co. for use on Digital Equipment Corp. PDP-11s has been adapted to run, in one version, on the larger scale PDP-11/45 and 11/70 and, in another packaging, on the VAX-11/780.

The major difference between the seventh edition of Unix (for the high-end PDP-11s) and Unix V32 appears to be the latter system's ability to support 32-bit addresses and 32-bit data which is utilized by the VAX-11/780.

Unix itself supports a hierarchical file system incorporating demountable volumes; compatible file, device and interprocess I/O; the initiation of asynchronous processes; a system command language selectable on a per-user basis; and more than 100 subsystems including a dozen languages, according to a spokesman.

In both adaptations, the code of the operating system and most utilities have been "extensively revised" to minimize the software's dependence on particular hardware. Unix V32 is highly compatible with Unix version 7, the spokesman stressed.

Fortran Becomes Ratfor

A compiler built to ANS Fortran 77 specifications is said to be compatible with the C language support at the object level. In addition, a specialized utility "converts old, ugly Fortran into Ratfor," a structured dialect usable with the new compiler, he said.

The C language itself now supports definable data types, generalized initialization, block structure, long integers, unions and explicit type conversions. A verifier routine provides type checking and detection of probable errors and portability problems, even across separately compiled functions, the spokesman continued.

For most users, communication with Unix is carried on though a program called the Shell. In these updates, a completely new Shell supports string variables, trap handling, structured program-

(Continued on Page 38)

The only Cobol oriented Symbolic Debugging System for CICS, that uses ANSI Cobol verbs as interactive debugging commands.

All CICS application abends are trapped and displayed symbolically to the application programmer at the terminal. If any abend occurs, the statement number and the Cobol verb that caused the error is displayed at the terminal. The Cobol program data areas can be displayed and or altered using normal Cobol verbs such as (MOVE or DISPLAY) referencing the Cobol data division names or statement numbers. The application logic can be altered interactively using the Cobol GO TO verb, referencing a paragraph name or statement number. Any number of program stops (READY TRACE) can be set using a single command, by referencing paragraph names or statement numbers. All program stops can be displayed with a single command. Any number of stops can be removed with a single command. All stops can be removed without having to specify any of the paragraph names or statement numbers where the stops are set. Both CICS Command level and macro level are supported.

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Despite 100% Expansion Annually

WP Maker Edits Inventory With Package's Help

FLORHAM PARK, N.J. — Despite sales and production expansion at a rate of 100% per year, Vydec, Inc. has been able to reduce its raw materials inventory by 30%. This minimizes Vydec's investment in raw materials on hand per sales dollar.

The key to such control is a package called MFG/3000 from Hewlett Packard Co. Installed on a 512 K-byte HP 3000 mid-sized system, the software manages production order releases, purchasing, part-to-schedule allocation and management reporting for Vydec's entire product line, a task that involves keeping track of some 5,000 individual items, subassemblies and components.

Vydec assembles and markets floppy-disk-based word processing (WP) systems. Products are assembled in a variety of standard configurations from the 5,000 components and subassemblies supplied by vendors. Vydec schedules production based partly on its backlog, which means it cannot afford to overbuy or underbuy from its vendors.

According to Vydec administrative vice-president Bob Frankel, "We don't want unhappy customers, but we also don't want any inventory of finished goods. As a consequence, materials management is a critical factor for our success.

"MFG/3000 and the HP distributed processing systems have kept pace with our own exceptional growth and expansion. The materials planning and control system has solidified our ability to control inventory costs while meeting customer demand."

Preparing MRP

MFG/3000 compares Vydec's own production master schedule to the bill of materials and item master files, as well as the current inventory and order status, to prepare a complete material requirements plan, with suggestions for new work orders, new purchase orders and time-phased inventory allocations to meet the schedule.

All entries into the materials management system are made from terminals connected directly to the computer to ensure that all plans, schedules and inventories are managed from up-to-date data.

Parts assigned to a work order are withdrawn from inventory, and inventory balances are adjusted to reflect this. Ordered parts are shown immediately in the order files with exact shipment dates.

The system prints out action reports as requested, showing details of current inventory, orders, expected receipt dates and so on to present a complete picture of the company's materials flow.

Action reports are augmented by exception reports on parts. Four exception reports are generated regularly on each material plan. The reports cover orders:

- To be placed for parts.
- To be pulled in because they are late.
- To be pushed out because they will not be needed as originally planned.
- To be canceled.

Since MFG/3000 works from Vydec's latest master schedule, these reports are current and accurate.

According to Vydec materials manager Marty Connolly, "We now have a very short turnaround time between recasting our master schedule and coming up with the material requirements plan — about two days vs. the two weeks or more before we installed the new system."

Understandable Errors

Earlier, Vydec used a computer only to maintain its bill of materials and item master files. The rest of materials management — production scheduling, material requirements planning and purchasing — was handled manually, with card systems. All computation was done by hand and entered into these card files.

The earlier method was much slower because of understandable but difficult-to-detect errors and oversights. For each recasting of the master schedule, the computer ran the bill of materials.

Inventory clerks then had to assign parts and adjust balances manually. Later, they would notify purchasing of deficiencies to be made up and orders to be placed to meet the schedule.

The whole process took two weeks or more and could sometimes result in overbuying or underbuying. It always required maintaining an inventory sufficient for any situation that might arise before the new material requirements plan was issued.

The current system uses online terminals located in the engineering, production control and purchasing departments and the stockroom for entering data "live" into the computer. As a consequence, all the data used by each department is up-to-date.

The CRT screens display menus of commands and options. If a user is not sure what to do, he can initiate a "help" procedure that will display information on making the correct entry.

The displayed data entry forms can match the printed forms originally used by the departments, and each entry into a blank is checked automatically to make sure it is within the proper range.

MFG/3000 consists of Engineering and Data Control, for managing the bills of material, the master item file and standard routing or bill of labor; Inventory and Order Status for controlling stockroom inventory and purchasing and manufacturing orders; and Material Requirements Planning for planning inventory procurements based on demand for products reflected in Vydec's master schedule.

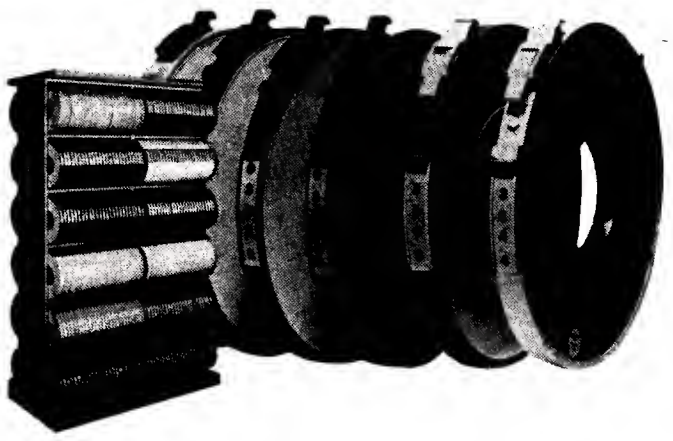
LSD-8 Aids PDP-8 User

NEW YORK — The LSD-8 package from Interactive Elements, Inc. (IEI) supports users of Digital Equipment Corp. PDP-8 minicomputers by implementing a data structure known as the B-tree, which has been especially successful in mainframe data base systems, according to an IEI spokesman.

The package is a collection of utilities and subprograms that can be used by Fortran or assembler programs. It allows rapid search, insertion and deletion of records of various sizes.

Two versions of LSD-8 are available. A stand-alone system costs $750; a "foreground-background" implementation costs $875. Both can be acquired for $1,250, IEI said from 76 Beaver St., New York, N.Y. 10005.

TAPE FILING



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Mini, Micro 'Polyforth' Cuts Developer Time

MANHATTAN BEACH, Calif. — Polyforth, an integrated operating system and multilevel programming language from Forth, Inc., can cut software development time for minicomputers and microcomputers 50% to 90% while reducing memory requirements 30% to 80%, a spokesman claimed.

This implementation of the dictionary-driven Forth language is perhaps most useful to installations developing software to be installed on microcomputers that are never to be programmed or even directly accessed by the end user. Units built into a washing machine, for example, fall into this class of target machine, the spokesman said.

Combining features of Forth's Miniforth and Microforth products, Polyforth offers a faster dictionary search algorithm, all 16-bit arithmetic, a more secure multiprogramming control, simplified vocabulary handling, a simpler target compiler and an improved text editor.

The "target compiler" approach is one of the features that account for the sharp reduction in development time under Polyforth. With this approach, the software is developed on the same type of hardware it will run on, eliminating all conversion problems, he claimed.

The more conventional cross-compiler approach enables the developer to work on a system that may be convenient — physically or in terms of its capabilities — but different from the target machine.

Polyforth is available for 8080-type microcomputers as well as the Texas Instruments, Inc. TI9900 and is running in a custom environment on an Intel Corp. 8086. The micro-oriented package costs $4,000; an implementation for the Digital Equipment Corp. PDP-11 costs $7,500, the spokesman said, noting that it requires more installation support than the micro version.

Forth is at 815 Manhattan Ave., Manhattan Beach, Calif. 90266.

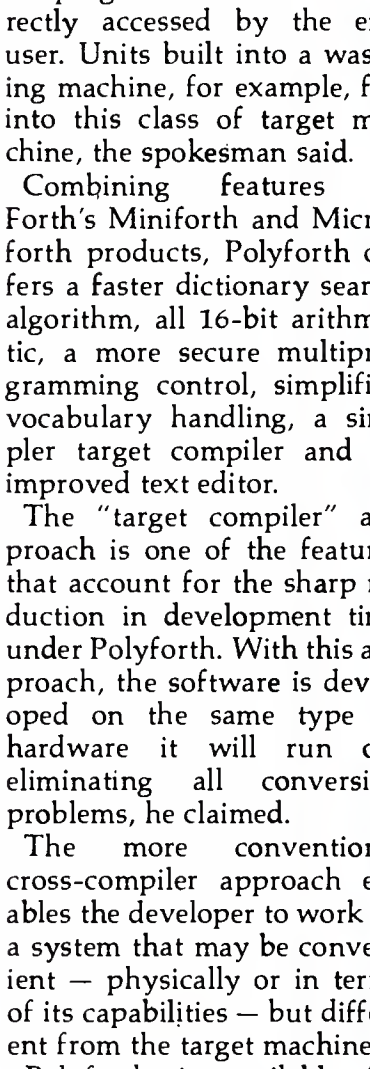
Price of 'ACF2' Going Up

LOS ALTOS HILLS, Calif. — Users acquiring the Access Control Facility (ACF2) package after July 15 will be charged 16.6% more than those who get the software prior to that date, according to the vendor, Cambridge Systems Group (CSG). Introduced last March, ACF2 enables MVS sites to impose protection in stages to block unauthorized use of sensitive data.

The first stage is a "silent" monitoring of accesses to specified data sets without recording anything. The logging stage follows, reporting security breaches but taking no action to stop them, the spokesman said.

The third stage allows operations management to decide on a case-by-case basis whether to allow access when it violates one of the preset rules. The fourth stage simply cancels any job that attempts to violate an access rule, he noted.

After July 15, ACF2 will cost $21,000 or $875/mo, instead of the current $18,000 or $750/ mo, for the first CPU at a user site. For additional CPUs at the same site, the package will cost $14,000 or $583/mo, rather than $12,000 or $500/mo as currently charged, CSG said from 24275 Elise, Los Altos Hills, Calif. 94022.



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Maximum Memory	256KB	256KB	4MB	1.87MB	2MB
Number of Registers	8	16	128	8	128
Direct Addressing	56KB	56KB	4MB	.5MB	32MB (virtual)
Writable Control Store	No	Yes (opt.)	Yes (opt.)	Yes (opt.)	No
Shared Memory Support	No	No	Yes (opt.)	Yes (opt.)	No
Pricing – Processor 256KB, PF/AR, Systems Console, Chassis and Cabinet	$29,700	$41,900	$33,500	$41,[illegible]	[illegible]70,000
256KB Expansion Memory	N/A	N/A	$10,000	$12,500	$15,000

	Optimizer Technology	Average Compile Time	Whetstone Benchmark	Matrix Inversion Program	Binary Search	Price*
3220 FORTRAN VII	Global	2000 LPM	2.25 Sec.†	3300 Sec.†	39 Sec.†	$ 88,600
VAX FORTRAN IV Plus	Block	1300 LPM	.85 Sec.	3700 Sec.	109 Sec.	[illegible]

*Both 3220 and VAX configured with: 512KB, Floating Point, 10MB Disk, Dual Density Tape, OS, FORTRAN.
†Without cache memory option.

Visit Perkin-Elmer at the NCC, June 4-7, in New York.

WP System for PDP-11 Updated

PLACENTIA, Calif. — A word processing system based on Digital Equipment Corp. PDP-11s running under RSTS/E, Word-11 has been enhanced and Release 2.0 is now available from Data Processing Design, Inc.

The features added in Release 2.0 generally refine what was previously available. Support for both right-aligned tabs and decimal-aligned tabs, for example, are in place now and so is a facility the spokesman called "semiautomatic" index creation.

A table of contents is created automatically, and the package supports a footnoting capability. "Semijustification" is still another feature and so is the ability to access stored text through a user-defined key.

The "cut-and-paste" facility from the earlier Word-11 — a capability that allowed the user to relocate whole blocks of text — now allows up to 25 blocks to be saved between documents.

Data Processing Design leases the software to installations with the appropriate hardware for $7,500, but can also provide a complete hardware/software turnkey implementation starting at $45,000 for a four-terminal system, the vendor noted from Suite F, 181 W. Orangethorpe, Placentia, Calif. 92670.

Study by Marines Proves Listings Value

(Continued from Page 33)

and object code (in both assembly mnemonics and octal representation). These listings also provide extensive cross-referencing and set/used information on all program elements.

6. English language narratives (Narr), which precede and explain each program module or procedure.

Results of the questionnaire were, overall, not very surprising. Programmers everywhere seem to consider the program listing their most useful tool so, as expected, List came in first. Narratives, in second place, were followed in sequence by flowcharts, hierarchy diagrams, data base design documents and Hipo charts.

Two statistical issues concerned us: the amount or degree of difference among the various tools and the level at which the results were statistically significant. The method of paired comparisons, based upon the number of times one technique was preferred to the other techniques, was used to obtain the interval scaling shown above.

The scaled values, normalized to zero, show that List is clearly regarded as the superior documentation tool and is as much "better" than Narr as Narr is "better" than Hipo.

The results were not because of random error, but actually reflected the programmers' perception of the usefulness of the tools. List is clearly superior, Narr is "above average" and DBDD and Hipo are perceived as having much lesser value.

The results of this questionnaire, combined with other discussions and analyses, have caused MCTSSA to stress the importance of a well-commented, readable and structured program listing.

High-quality listings will be obtained by developing a Programming Standards and Conventions Manual, which requires listings to have these properties.

Although the DBDD and Hipo are important for design, and extensively used at MCTSSA, they are of lesser value for maintenance and are no longer required documents.

Maj. Gordon E. Anderson, USMC, is head of the Programming Section and Maj. Kenneth C. Shumate, USMC, is the staff operations analyst at MCTSSA, at Camp Pendleton, Calif. Anderson also teaches at Miracosta College, Oceanside, Calif., while Shumate teaches at both San Diego State University and National University.

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BCS Moves Into Midwest

Illinois Banks Get Alternative to In-House DP

CHICAGO — Bankers operating in Illinois will shortly have an alternative to in-house DP operations. The Bank Services Division of Boeing Computer Services, Inc. (BCS) has announced plans to establish a data center here so that it can offer a line of services to the banks in this state.

The initial configuration for the center will include a Cummins-Allison Corp. 6400 capture/print system and a Hewlett-Packard Co. HP 3000 host for on-line work. This will serve as a local node in the nationwide BCS network, which was designed primarily around IBM mainframes.

The banking division's on-line system currently provides full support for Bunker Ramo Corp. BCS 90 hardware and software. Work is under way to support a variety of other terminals including NCR Corp.'s 279s, a BCS spokesman noted.

Loans Support

The BCS services are said to be up-to-date with new requirements, whether regulatory, legislative or driven by competition. Automated transfer services are among the offerings as is support for reserve loans, he said.

Demand-deposit accounting, savings, certificates of deposit, installment and commercial loans, general ledger, credit-card processing and real-estate loans are supported by the BCS Bank Services Division, the spokesman added.

Per-Account Rates

The banking division also supports those banks that wish to do their own capture operation, in order to retain in-house control of their items. BCS will provide software and technical support for any customer wishing to install Cummins-Allison equipment in their own bank, he said.

Support for NCR 7750 is expected to be ready shortly, he added.

BCS charges for its services primarily on a per-account basis by application. Certain applications — transit and account reconcilement, for example — are priced on a transaction basis. Processing and printing are normally priced separately, the spokesman added from temporary offices at 35 E. Wacker Drive, here in Chicago.

The banking division has data centers already in place in Washington, California, Nevada and New Mexico. The BCS Thrift Services Division operates in the eastern U.S., supporting thrift institutions in New Jersey, Pennsylvania and Georgia.

BCS is headquartered at 177 Madison Ave., Morristown, N.J. 07960.

Itel Microcode Eases VM Usage

(Continued from Page 33)

out of conventional software implementations — which are relatively slow in execution — and into microcode. These include such functions as Channel Control Word (CCW) translation, maintenance of dynamic storage and dispatching, the spokesman noted.

Lastly, the Virtual Interval Timer Assist component maintains the interval for each virtual machine with the same accuracy as is usually possible with a real machine timer, he claimed.

EVM is distributed to AS/7031 users on a flexible diskette. The complete firmware package may be leased for $1,000/mo, but individual components are available separately for those installations that wish them, the spokesman said from One Embarcadero Center, San Francisco, Calif. 94111.

Unix Moved To 11/70, VAX

(Continued from Page 33)

ming, user profiles, user-defined search paths and multilevel file-name generation.

For document preparation, a phototypesetter utility is standard and another routine, for terminals, is now "highly compatible" with the phototypesetting logic. A macro package provides "canned commands" for many common formatting and layout situations.

Still another utility performs spooled-file transfers between any two machines.

The seventh edition of Unix is available now for $28,000 for the user's first CPU, $9,400 for each additional unit. The V32 implementation costs $40,000; additional CPUs are $15,000.

Western Electric's software licensing arm can be reached at P.O. Box 25000, Greensboro, N.C. 27420.

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On-Line System Sharpens Firm's Forecasts

GREENWICH, Conn. — U.S. Tobacco Co., a $250 million diversified consumer products company headquartered here, reports greatly improved accuracy in its product forecasting since it began using an on-line information analysis system provided on the remote-computing facilities of California-based Tymshare, Inc.

"With the system, our forecast came within established variances against actual 1978 shipments, and we were very pleased with the results," Robert Klouse, the company's director of corporate development, said recently.

Recent substantial sales increases of its moist, smokeless tobacco products, such as Skoal, Copenhagen and Happy Days, prompted U.S. Tobacco to upgrade in 1978 from manual monthly and yearly forecasts to the computerized statistical analysis system.

Even though a substantial in-house DP capability — configured around an IBM 370/145 — already existed for routine production and reports, management agreed some form of computerized analysis was needed to perform two-, three- and five-year projections for the company's 67 products which are grouped into 15 product lines.

"We didn't have the time or capability to develop our own statistical analysis routines, so we began to check into outside vendors for a time-sharing solution," Klouse explained.

Sophisticated Needs

The system the company needed had to be quite sophisticated, since the marketing of tobacco requires planning data that looks ahead several years. "We have to age our tobacco for three years before putting it into production. Therefore, to help determine our tobacco requirements now, we must have a good idea of what our product mix will look like at least three years from now," Klouse explained.

He looked at various vendors and products, investigating system capability, level of support, start-up time, comparative costs and other crucial factors. Tymshare offered Express — developed by Management Decision Systems, Inc.— which had capabilities he wanted to explore.

"But it was the Tymshare people who really sold me on Express," Klouse said. "They are professionals who understand our real requirements, and they are there when we need them."

U.S. Tobacco is now using Express' statistical forecasting tool, "Accufor," to perform three- and five-year forecasts. What attracted Klouse to Accufor was its highly sensitive response to minor variations in data and its ability to separate "trend" from "seasonality." Trend is the steady increase or decrease of values, ignoring ups and downs that depend on the time of the year, while seasonality is the regular fluctuation of values at predictable times during the year.

Klouse said the mathematics involved to distinguish trend from seasonality is so complex that, "without the right software, we'd certainly be hard-pressed doing it by hand."

Accufor permits simple, time series analysis with U.S. Tobacco's historical values contained in the Express variables. Causal effects can then be studied by introducing "control variables" from the Express data base into this model. "It's so easy to use," said Klouse "that after only three weeks of instruction, I was ready to present an on-line demonstration to our company's board of directors."

Forecast Preparation

Using 10 years of historical data from his in-house data center, Klouse devised an operational data base of sales broken down by month and product. From this base, he initially prepares an annual forecast, constantly updating it as he acquires new data.

"We run monthly forecasts and compare forecast sales to actual sales," he said. "If the forecast is not within certain established parameters, we investigate market and sales conditions and also review our forecast definition for possible adjustment."

For example, since promotional activity usually boosts sales, Accufor allows Klouse to adjust his forecast to take into account the increased sales of the advertised product.

Graphs play an important role in forecasting. Express has extensive built-in graphics capabilities which Klouse puts to good use with his Tymshare Model 325 terminal printer. He says that two-color charts, scatter diagrams and various styles of graphs help to "highlight and point out things that people don't normally see by looking at only a row of numbers."

Klouse is pleased with the results. He said Tymshare people are dedicated to management problem solving and Express was designed as a "comprehensive system to give the decision-maker a full repertoire of information analysis tools."

Express has both the flexibility and responsiveness to let Klouse continually try new variables and test new methods. "It's the fast, accurate manipulation of data that makes the system so convenient and valuable," he said. And by adjusting his daily schedule, Klouse can realize additional cost savings by taking advantage of non-prime and batch-time rates. Express also helps him prepare easier-to-read, more informative formal reports for use by other departments.

Klouse made use of Express in still another area of company decision-

(Continued on Page 40)

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Wholesaler Puts Distribution System to Work

BOISE, Idaho — Chandler Corp., a major remanufacturer and wholesaler of building materials for the manufactured housing and home center industries, is implementing Burroughs Corp.'s Distribution Information System (DIS) software with a Burroughs B1860 medium-scale CPU.

"In today's economy, a business that is growing rapidly is facing an economic question mark. We cannot afford to have poor control over our inventory, which is one of the company's largest assets," Dean Pierose, vice-president for administration said.

"We feel very strongly that DIS is a major tool for enhancing our profitability and will certainly enhance our service," he continued. "In the wholesale business, you don't work with very big margins, so the biggest difference between one wholesaler and another is service. We feel that DIS and the B1860 will provide us with a service capability to our customers that our competitors won't have."

Significant Year

Last year was a significant one in terms of Chandler's DP capabilities. In January 1978, it converted from a Burroughs B1716 to the present B1860. In October, it began test use of the DIS software.

The corporation has 18 divisions across the U.S. and deals in some 10,000 specialty items, plus lumber. It wholesales this material to home centers and building materials dealers.

In addition to DIS, which went into production status in April, other Burroughs-supplied software in use at Chandler includes Data Management II (DMS II), Command and Edit (Cande), the Generalized Message Control System (Gemcos) and Network Definition Language (NDL), Pierose recounted.

Plans call for installation of Burroughs TD 830 input and display systems in all the divisions nationwide for continuing control of personnel and credit systems, plus support of DIS. Currently, 13 TDs are used in a centralized accounting operation within Idaho.

"Presently, we are doing accounts receivable and payable, general ledger, financial planning and sales analysis," Pierose continued. "We can program for virtually any type of sales analyses we want, and we have a rather elaborate financial and budget-reporting system.

"In a business such as ours where we sell everything to construct a home, except electrical and plumbing fixtures, we must know exactly where we stand regarding inventory and serviceability," he concluded.

Headquartered here in Boise, the corporation employs some 800 people nationwide. Through March 31, 1979, the corporation has announced anticipated revenues in excess of $115 million.

Getting what you pay for — the hard facts about systems sofware.

Fact or myth? Increased capability means increased cost. Find out the truth in our June 25th supplement: *Systems & Utility Software*. Edited by Don Leavitt, this special report will give you important information ranging from the gross statistical to interviews with specific users about why they chose particular packages.

In the area of operating and utility software systems some of the topics we'll be taking a close look at are:

- *Resource allocation*
- *Performance Measurement/Enhancement*
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- *Control of access*

What are the best tools available for individual DP shops? Is the increasing practice of going outside to independent software houses the best choice?

Our special report will provide answers to these questions and a factual discussion of the do's and don't's of aquiring software packages.

If you're an MIS executive, DP Manager, Supervisor or Programmer, you'll find our June 25th report especially valuable. If you market systems or utility software — your ad should be there. Closing date is June 8th. To reserve space, call Melinda Walker or Miriam Gaylin at (617) 965-5800.

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'Olaps' Copes With Payables

NEW YORK — The On-Line Accounts Payable System (Olaps) introduced recently by Decision Concepts, Inc. enables clerks to enter invoices, update and query files, validate vouchers and generate a wide selection of conventional reports from on-line, interactive terminals.

Described as price-competitive with batch-oriented accounting packages, Olaps runs under CICS on small to intermediate IBM 370s.

The user-sensitive nature of the package is illustrated by the acceptance of the first 10 characters of a name when an operator is attempting to identify a vendor. Olaps displays complete identification and prompts the operator with instructions for further processing, a spokeswoman noted.

Olaps provides on-line vendor (payee) file maintenance and inquiry without keypunching, edit reports or vendor listings; on-line query, with display of information by vendor or by invoice; and audit trail logic, which can provide voucher aprons and other hard-copy reports for attachment to the vendor invoice.

Olaps can be interfaced with any general ledger financial system. It costs $20,000 for use under DOS/VS and CICS on 370s ranging from the Model 125 through the 148. It is available, at additional cost, for use under OS/VS, the company said from 415 Madison Ave., New York, N.Y. 10017.

Firm Sharpens Sales Forecasts

(Continued from Page 39)

making. Management had preselected a number of possible sites for a new plant and, based on sales trends and projections, one site would be selected for construction.

To optimize selection, Klouse simply used Express' trend fitting capability to analyze the accumulated data at a different level — product sales broken down by state. Within four weeks, he generated reports on product growth for each state, shipping weights for freight cost and analysis and projection of sales trends for the next 10 years.

"Express generated information that served to confirm our planning strategies and helped to pinpoint the best site," Klouse said in conclusion.

But Standards Lacking

Great Growth in Local Networks Cited

By Ronald A. Frank
CW Staff

BOSTON — Many users are beginning to use local data networks for the transmission of data, but approaches are varied and few standards exist as yet. This was the view of speakers at the recent Local Area Communications Symposium here sponsored by Mitre Corp. and the National Bureau of Standards (NBS).

A status report on technologies in local data networks was delivered by Ira W. Cotton, manager of local area networking and office systems at NBS, who told attendees that these nets are being implemented in ever-increasing numbers.

Despite the fact that much research is being done with these nets, standards have not yet been formulated. The "time seems ripe" to establish common approaches, Cotton said. Each local net is implemented to solve a specific problem, but this will soon change because turnkey local network systems are becoming available, he predicted.

One of the factors affecting the growth of these nets is that they are an "essential ingredient" of office automation systems.

Cotton pointed out that local nets can serve as the focal point for distributed architecture systems in the office of the future. In such configuration, the local network will tie together office functions with DP and network operations to provide an integrated system.

Included in such nets will be such diverse functions as computer output microfilm, photo composition, bulk storage, general-purpose DP systems, hard-copy and CRT terminals and gateways to carrier network services.

Designers' Elements

Designers of local data nets must take into account data transmission rates, connection of user device, tolerable error rates, speed conversion, code conversion and level of terminal support, Cotton said. Many local nets utilize coaxial cable technology, which allows high bandwidth in the backbone with a typical 1M bit/sec capacity to accommodate large numbers of terminals, he explained.

While most current terminals can operate within 9,600 bit/sec burst data rates, distributed processing architectures may require higher data rates, he said.

Local area networks usually apply to environments that cover an area of 10 meters up to several kilometers and can be effectively served without common carrier facilities. The nets can be switched or nonswitched using various technologies. Ring nets, the Aloha net at the University of Hawaii and the Xerox Corp. Ethernet are examples of the various methodologies used, Cotton said.

A local circuit-switched network can be configured using phone company local-loop facilities on either dial-up or private lines. These would use modems and the switching would be done by a PBX. This type of private switching capability may be offered as part of AT&T's Advanced Communications Service, according to Cotton.

A local message-switched network utilizes a star configuration with the switching device at the center. It may use message- or packet-switching technology in the switching device, which is usually a minicomputer, he explained. These nets are similar to wide-area switched networks.

Ring nets move messages around a ring structure at high speed. The ring interface at each station scans message addresses to copy those intended for its station. The originating station processor removes the message when it returns to the point of origin on the ring.

Cotton described the Aloha net as the first significant contention-based net. It utilizes different channels for inbound and outbound traffic and connects terminals to a central station using a radio distribution system.

The Xerox Ethernet utilizes cable TV-type cable for its backbone distribution system

(Continued on Page 44)

Diagnostic Unit From Tran Tests Three Levels of X.25

MARINA DEL REY, Calif. — Tran Telecommunications Corp. has introduced a microprocessor-based X.25 tester that can monitor three levels of the protocol.

Called XPRT, the diagnostic unit tests the electrical, link control and data packet levels of X.25 when used in conjunction with a CRT or teleprinter. The tester can be connected in local mode or via remote links and check both terminal equipment networks, Tran said.

When used as a simulator, XPRT can provide automatic or user-specified frame generation, frame display and validation, packet generation of error conditions and loopback testing. When used as a line monitor, the device can provide a readout of traffic data.

Interactive control is achieved using either RS-232C or V.24 interfaces with Ascii code. The unit operates at speeds up to 9,600 bit/sec between the tester and the console with either hex or octal notation, Tran said.

The user has control of protocol parameters, window size, time-out values, frame and packet parameters and similar variables, a spokesman noted. Deliberate frame errors can be introduced.

The tester is provided with software and instructions. XPRT costs $15,000; first deliveries are scheduled for September, he said from Tran at 2500 Walnut Ave., Marina Del Rey, Calif. 90291.

Distribute Your Ideas

Everyone is talking about distributed DP. It is happening when a company installs processors at remote sites to transmit data back to the main DP center. It is happening when data bases reside in different pieces at different locations.

There are many ways to implement distributed DP, and these methods will be the subject of an upcoming special report in *Computerworld*.

Contributions to this special report are welcome. Articles should be four to five typed, double-spaced pages; supporting charts or artwork are also welcome.

Questions about the suitability of an article should be directed to Ronald A. Frank, who is the editor of this look at distributed DP.

Articles should be sent by June 11 to Frank at CW, 797 Washington St., Newton, Mass. 02160.

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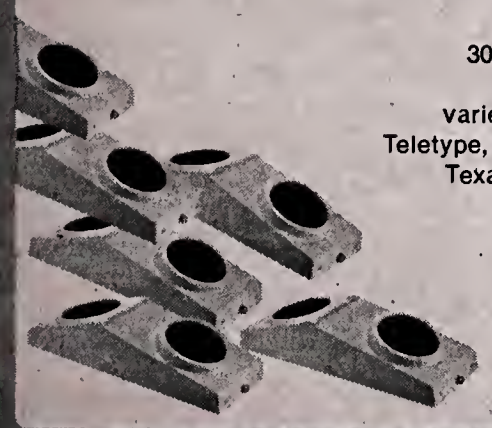

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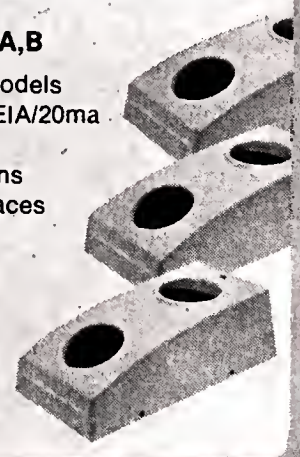

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Included in the plan are the *Silent 700* models 732 and 733 with their magnetic-tape cassettes for off-line storage, the compact, reliable 743 and its portable counterpart, the 745. And even the 763 and portable 765, with nonvolatile bubble memory.

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If you would like more information on TI's new discount plan, contact the TI sales office nearest you, or write Texas Instruments Incorporated, P. O. Box 1444, M/S 7784, Houston, Texas 77001, or phone (713) 937-2016.

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Two Electronic Registers Added to NCR Line

DAYTON, Ohio — NCR Corp. has added two electronic cash registers — NCR 2125 general-purpose and grocery models — to complement the company's line of free-standing registers.

Model 2125 has performance capabilities that fall between NCR's Model 2120 and the more sophisticated 2140, a register that can accommodate Universal Product Code scanning devices. The systems are based on NCR's MED-80 microprocessor and proprietary nonvolatile random-access memory.

Both systems use a compact single-wire dot matrix printer that provides journal and customer receipt printing and has the ability to print an inserted form such as a customer check for validation, NCR said.

A check tendered for payment alerts the machine to require the cashier to insert the check into the printing station for validation. The printer can be programmed to print 4-char. word descriptions on the customer's receipt, noting the department or the type of merchandise purchased.

Control features include sign-in code numbers for cashiers. At the beginning of a shift, the cashier enters a number and the system automatically keeps track of each worker's total.

The register's Audaction feature notes exception conditions, such as negative totals or refunds, printing special symbols on the journal tape and keeping a running total of the number and amount of these types of transactions for management review, NCR said.

Other control mechanisms include High Amount Lockout (Halo), a feature that prohibits a department's sales beyond a certain amount and an optional features called "supervisor intervention," requiring intervention and review by a supervisor when certain types of transactions are performed.

Both the general-purpose unit and the grocery model registers have the ability to automatically calculate two separate types of taxes and to keep separate totals on the amount of taxes as well as the amount of sales taxes under the two rates, the company said.

The grocery unit is programmed to handle food-stamp sales, coupons and returns and split-package pricing. Options for the grocery system include the ability to add an electronic scale as well as a price lockup capability for 400 items.

The 2125 general-purpose system will be available in June for $1,595. The grocery model will be available in July with purchase prices beginning at $1,745 from NCR in Dayton, Ohio 45479.

ICCC Seeks Net Papers

ATLANTA — Papers are being sought for presentation at the Fifth Internationl Conference on Computer Communications (ICCC) to be held Oct. 27-30, 1980 at the Peachtree Plaza Hotel here.

The conference is an interdisciplinary forum for the discussion of social, economic, political and technological implications of computer communications networks.

Topics for 1980 include a wide range of subjects relevant to the development and use of communications and its effect on human affairs.

Manuscripts should be typed, double-spaced, in English and no longer than 5,000 words. A 100- to 200-word abstract and a full set of illustrations must accompany the manuscript.

The program committee would appreciate advance notice of the intention to submit a paper. More information can be obtained from Wayne Adams at P.O. Box 500, Blue Bell, Pa. 19424.

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W. R. Ginn, Director of Technical Support and Howard B. Wilson, General Director (right); Management Information Services, Reynolds Metals Company

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Wilson: "It's really a better match for our needs. Even with most of our moderately-large files on MSS, we're only using about half of its 16 billion byte capacity. If we'd chosen a 25 billion byte MSS, we'd be paying for a lot of unused capacity for a long time. The Control Data MSS costs half as much, and still gives us ample capacity for future growth."

Ginn: "We're rapidly growing toward ddp and we're doing lots of remote job entry already. Of course both concepts involve the maintenance of large files centrally. Our users are happy with the improved turnaround on their jobs. With the MSS they can get at their files in seconds instead of waiting for operators to locate and load tapes."

Wilson: "We've already passed the break even point on cost just by the tape drives that we've been able to eliminate. It saves lots of operator time, enabling us to give our users all around better service. It just was the better business decision for us."

Perhaps you should investigate whether or not a Mass Storage System is the better business decision for your company. Call Control Data at 612/853-7600. Or write Control Data Corporation, HQN11I, P.O. Box 0, Minneapolis, MN 55440.

CONTROL DATA CORPORATION

More than a computer company

Converter Handles Ascii For Honeywell GRTS Users

AUSTIN, Texas — KMW Systems Corp. has introduced a data converter that sends and receives Ascii data via Honeywell remote terminal supervisor (GRTS) synchronous protocol.

The BAC-115 converter performs the required error-checking functions, translates slew codes to Ascii forms-control characters and communicates in serial asynchronous format to and from user-attached devices, according to a KMW spokesman.

It allows operation of a variety of peripheral equipment such as CRTs and line printers, he noted.

The BAC-115 reportedly insures error-free operation by utilizing Honeywell GRTS protocol with parity and block check character error checking, yet allows the user to attach a peripheral device equipped only with an asynchronous Ascii RS-232C interface.

The BAC-115 communicates via a modem connection utilizing GRTS. The converter and attached peripherals emulate a Honeywell H-115 with card reader, printer, optional punch and console.

Features include full GRTS "handshaking"; compressed data; split record transmission; internal buffering of 800 compressed characters; slew code to Ascii, CR, LF, VT and FF translation; modem specified data rates to 9,600 bit/sec; and point-to-point switched or dedicated data link operation.

The BAC-115 costs $4,450 from KMW Systems Corp. at 8307 Highway 71 West, Austin, Texas 78735.

Incoterm Cuts SPD Prices By Changing to MOS

WELLESLEY HILLS, Mass. — Price reductions up to 11% and a doubled memory capacity were recently announced on Incoterm Corp.'s SPD 20 family of intelligent terminal systems.

The systems allow modular memory expansion from 16K to 128K bytes in 16K-byte increments. The top memory previously available was 64K bytes.

The key to lowered prices and higher memory is the company's move from core memory to MOS memory, allowing the company to offer an improved price/performance ratio, a spokeswoman said. The MOS memory units are software-compatible with SPD 20 systems with core memory, she noted.

A system with eight terminals, communications links and the SPD 20 terminal processing unit with 16K bytes of MOS memory now costs $24,661 compared with $27,835 for the same system with core memory.

The same system with 16 terminals formerly cost $53,255; it now can be purchased for $47,681.

The SPD family consists of small, medium and large clustered modular terminal systems. A terminal can be attached to other terminals, disk drives, mass storage systems and other peripherals.

Incoterm is currently concentrating much of its SPD 20 efforts on software applications packages for airlines and banking. Incoterm, a Honeywell, Inc. subsidiary, is located at 65 Walnut St., Wellesley Hills, Mass. 02181.

Seminars Set In N.Y., Chicago

CAMBRIDGE, Mass. — Telecommunications and office automation, two areas undergoing change, are the subjects of one-day seminars scheduled next month in New York and Chicago by Arthur D. Little Impact Services.

Experts in each of the industries will examine the forces for change and assess the planning implications of developments for suppliers and users of those products, the sponsor said.

"The Emerging Real World of Office Automation" and "The Telecommunications Industry in Change" will be held in New York on June 25 and 26, at The Plaza Hotel and in reverse order in Chicago on the same dates at The Ramada O'Hare Inn. Anyone interested in both topics can thus attend two seminars in one city.

Registration information can be obtained from Arthur D. Little Impact Services, Acorn Park, Cambridge, Mass. 02140.

Local Networks Growing Fast

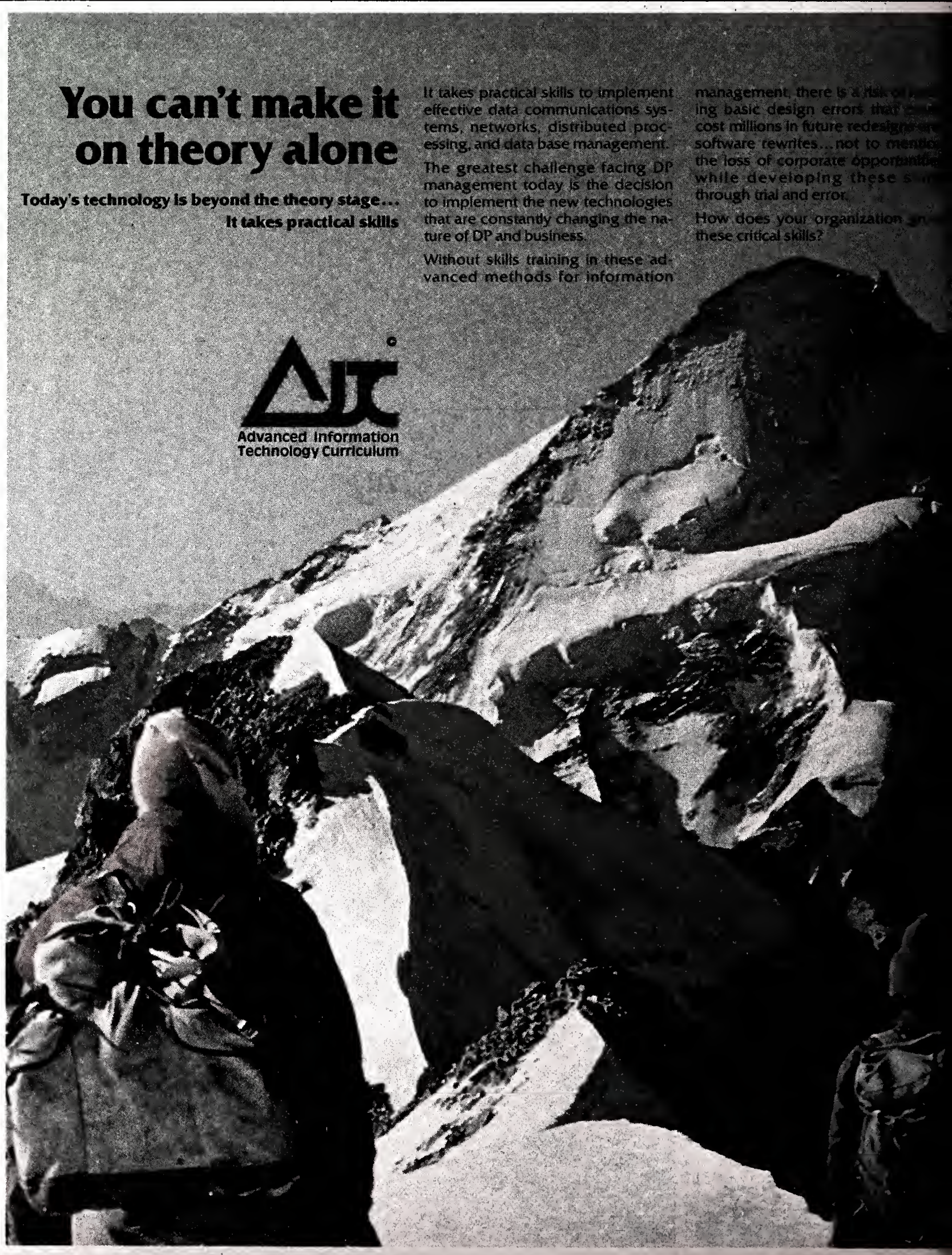
(Continued from Page 41)

and is a carrier-sense, multiple-access network, Cotton said. The backbone acts as a bus structure with various devices connecting onto the bus for use of the net.

A network now being implemented at NBS uses coaxial cable and will support laboratory processors, large mainframes, smaller minis and office teleprinters. It will support devices operating at 30-, 240- and 960 char./sec.

Even though various local data networks are now in operation, there is no "off-the-shelf" capability for users, Cotton noted. In addition, these nets require continuous maintenance and management to be successful. In cases where local nets cross into other environments, they are subject to a variety of regulatory conditions.

Despite these limitations, the field is expanding and these nets are finding an important place in filling the communications needs of users, Cotton concluded.



Telex 3270-Type CRT Offers Extra Features

RALEIGH, N.C. — A compatible CRT that reportedly offers capabilities not normally found on IBM 3270-type terminals has been introduced by Telex Computer Products, Inc.'s Terminal Communications Division.

Standard on the TC277-D are a tiltable CRT screen and a cursor that can be used in place of a light pen to improve the speed with which a field can be specified on a screen format, Telex said. "Deep-dish keys" aid in operator hand positioning.

Also included are automatic repeat on alpha and numeric keys an upper case or upper/lower case entry mode switch and a switch-selectable on/off keyboard clicker — features that should "permit operators to improve their data entry speeds in many jobs for which 3277-type terminals are used," a spokesman said.

A 25th line capability — in addition to the standard 24-line by 80-char. display — provides operator status reports on current cursor position and on a variety of modes.

Accidental loss of data is prevented by a data protection feature. The TC277-D is fully compatible with and operates under the control of Telex's Model TC371, 271 and 272 controllers, as well as IBM 3271 and 3272 controllers, and as a Level B device on IBM 3274 controllers. Its cost starts at $2,200.

Software From Tandem Gives X.25 Protocol Support

CUPERTINO, Calif. — A software package supporting the X.25 packet-switched network protocol has just been introduced by Tandem Computers, Inc.

Named Axcess, the package is supplied at no extra cost as a part of Tandem's Guardian operating system. It has received certification from Telenet Communications Corp. and Tymnet Inc.; it also meets requirements of Datapac of Canada, Tandem said.

Built for X.25

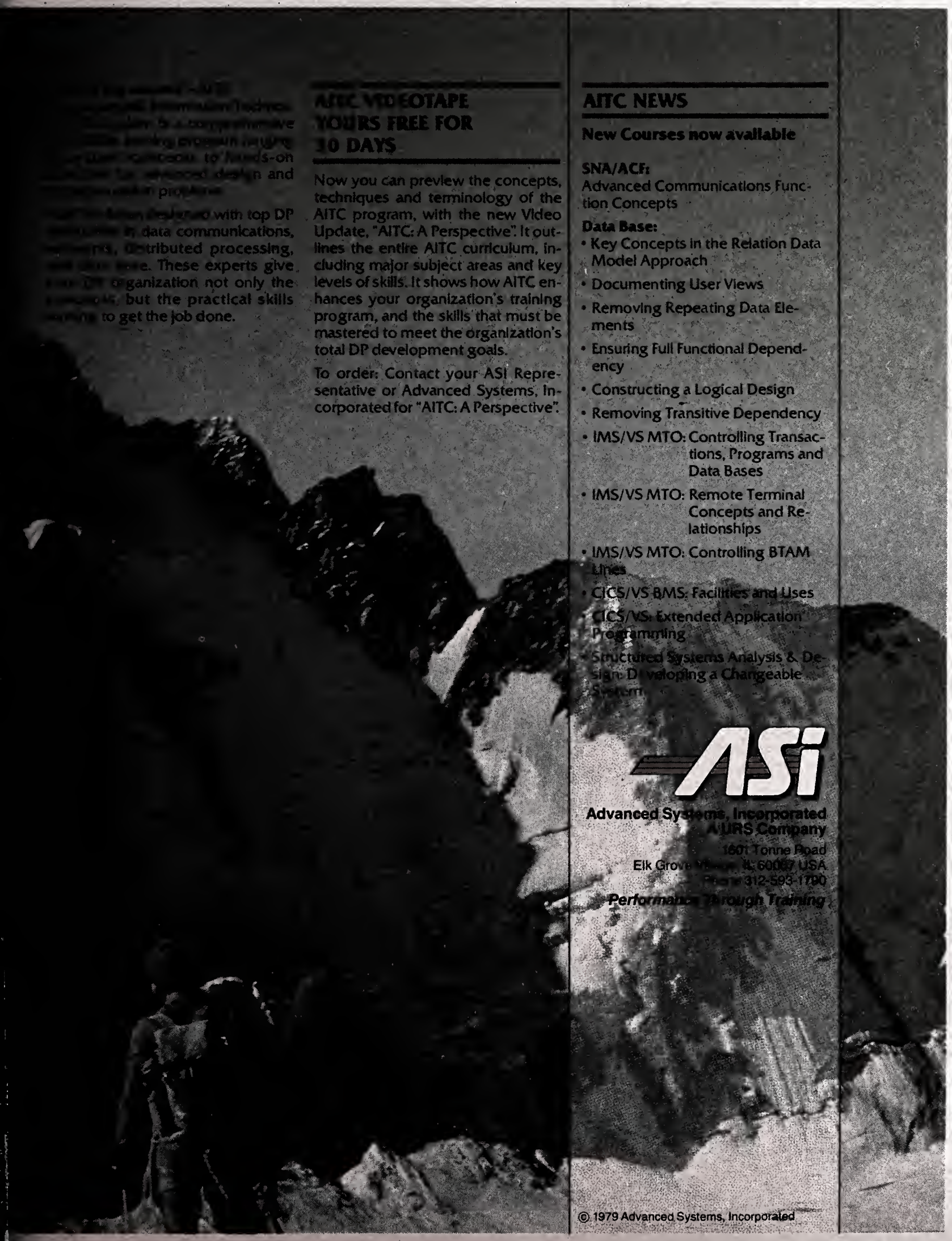
The Axcess package was designed to allow Tandem computer systems to communicate directly over public packet-switched networks using standard protocols defined for use with X.25.

In addition, the package allows an application within the Tandem system to communicate with any other data terminal equipment connected to the packet network using any agreed-upon protocol, the firm said.

Supplied With 'Guardian'

The X.25 package will be supplied along with Guardian to new Tandem users. Existing users can obtain Axcess by contacting their local Tandem office.

Tandem Computers is at 14333 Vallco Parkway, Cupertino, Calif. 95014.



AITC NEWS

New Experts now available

Ralph Berglund, a principal of Berglund and Smith, is consultant in data communications to Datamation magazine, Datapro Research Corporation, and many Fortune 1000 Companies.

Network Analysis, Inc., the leading consulting organization in the fields of network analysis, design and implementation. A staff of more than 100 is directed by Dr. Howard Frank.

Harold Uhrbach, the president of DBD Systems, Inc., has extensive experience in data base design, implementation, evaluation and selection.

Robert M. Wainwright, president of R.M. Wainwright & Associates, has been consultant to more than 200 organizations in the development of materials for skills training in distributed processing.

Dan McCracken, president, Association for Computer Machinery (ACM), is a leading author on programming and programming languages. He is working with ASI to scope applications software development.

Chris Gane and **Trish Sarson,** co-principals of Improved System Technologies, Inc., are leading proponents of structured systems analysis and design.

Dr. Dan Couger, professor at the University of Colorado and columnist for Computerworld, is assisting ASI in producing material on managing the DP professional in new environments.

Robert Fertig, V.P. of ACT/Technical Analysis and editor of Industry Analysis Newsletter, is analyst and advisor to ASI clients on the newest IBM systems.

John Collins, president of England's Savant Institute and an independent consultant in the information sciences and their application to management, is co-producing modules on queuing models for on-line systems.

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ADAPSO SOFTWARE INDUSTRY ASSOCIATION

Modem Stand-In, Switch Announced by Gandalf

WHEELING, Ill. — Gandalf Data, Inc. recently announced two products — a dual active modem eliminator and an electronic data switching system called the Front-End Switch.

The ME922 is a substitute for modems or data sets, permitting the direct connection of two business machines at EIA levels. It consists of two independent modem eliminators that operate in synchronous or asynchronous modes, generating or accepting data.

Signals are timed and controlled to emulate — through a flexible strap option — the action of a pair of modems, Gandalf said.

The modem eliminator includes a crystal clock for asynchronous applications and a carrier and data state indicator for each channel. The cost is $450.

The Front-End Switch can be used either for switching between redundant CPUs in case one fails or as the switching mechanism for a PBX system, the company said.

It is capable of connecting a number of asynchronous terminals to any of several sources of a computing service.

System switching is controlled by the "data terminal ready" (DTR) signal of the connected service.

Switching to a backup system occurs automatically when the DTR goes false on the primary system, Gandalf said.

Other features include operational speeds up to 9,600 bit/sec, transparency to data, status indicators for all channels and standard EIA RS-232C interfaces.

Statistical information on each change occurring in the system is automatically provided at a separate control and monitor port.

Gandalf Data is located at 1019 S. Noel, Wheeling, Ill. 60090.

Modem Works At Distances Up to 2.5 Miles

DOYLESTOWN, Pa. — Develcon Electronics, Inc. is offering a synchronous short-haul modem that operates at speeds from 19.2K- to 100K bit/sec at distances up to 2.5 miles on four-wire dedicated circuits.

The DS558 supports both Bell 303 and RS-232C operation and is reportedly part of the only modem family offering a two-year warranty.

Computer-controlled remote or local loopback allows automatic system testing under software control. A built-in LED indicator shows system status and assists in equalization settings during installation, Develcon said.

In a stand-alone configuration, the DS558 costs $747. It can also be ordered in a rack-mounted version, the company noted from 423 N. Main St., Doylestown, Pa. 18901.

NTSC Cuts Cost Of Sycor 445s

ANN ARBOR, Mich. — Northern Telecom Systems Corp. (NTSC) has reduced the purchase prices and lease rates on all of its Sycor 445 distributed data systems.

Purchase prices were reduced from 15% to 29%, while lease rates dropped by 9% to 24%, depending on system configuration, the company said.

NTSC quoted a purchase price of $32,640 for a "typical" 445 system. This includes 64K bytes of main memory, 5M bytes of disk storage, a 5M-byte tape drive system, four Model 4415 data stations, a 60 char/sec Sprinter printer and a communications adapter.

Purchasers can order up to four additional CRTs and as many as 308M bytes of disk memory.

Concentrator Fits DEC Gear

GOLETA, Calif. — A data concentrator that combines the functions of an eight-line Unibus asynchronous interface and an add-on statistical multiplexer is available for Digital Equipment Corp. users.

The TC-3 concentrator from Comdesign Corp. allows PDP-11, Decsystem 2020 and VAX users to add remote terminals and printers to their computers while reducing the transmission requirements from one-half to one-quarter the combined rate of the terminals connected to the systems, Comdesign claimed.

It is comprised of two subsystems: the TC-3 local unit and a stand-alone ac-powered remote concentrator connected to the communications line and up to eight terminals or modems. No software changes are necessary since the TC-3 is functionally equivalent to the DEC DZ11A interface, Comdesign noted.

Communications Choice

Communications between the two units is either by a direct-wire connection or a full-duplex 1,200- to 9,600 bit/sec leased line.

Two remote units can be connected to a single local unit for a total of eight ports, the company said.

The TC-3 concentrator costs $5,500 with additional remote units available for $2,750 from the company at Suite A, 340 S. Kellog Ave., Goleta, Calif. 93017.

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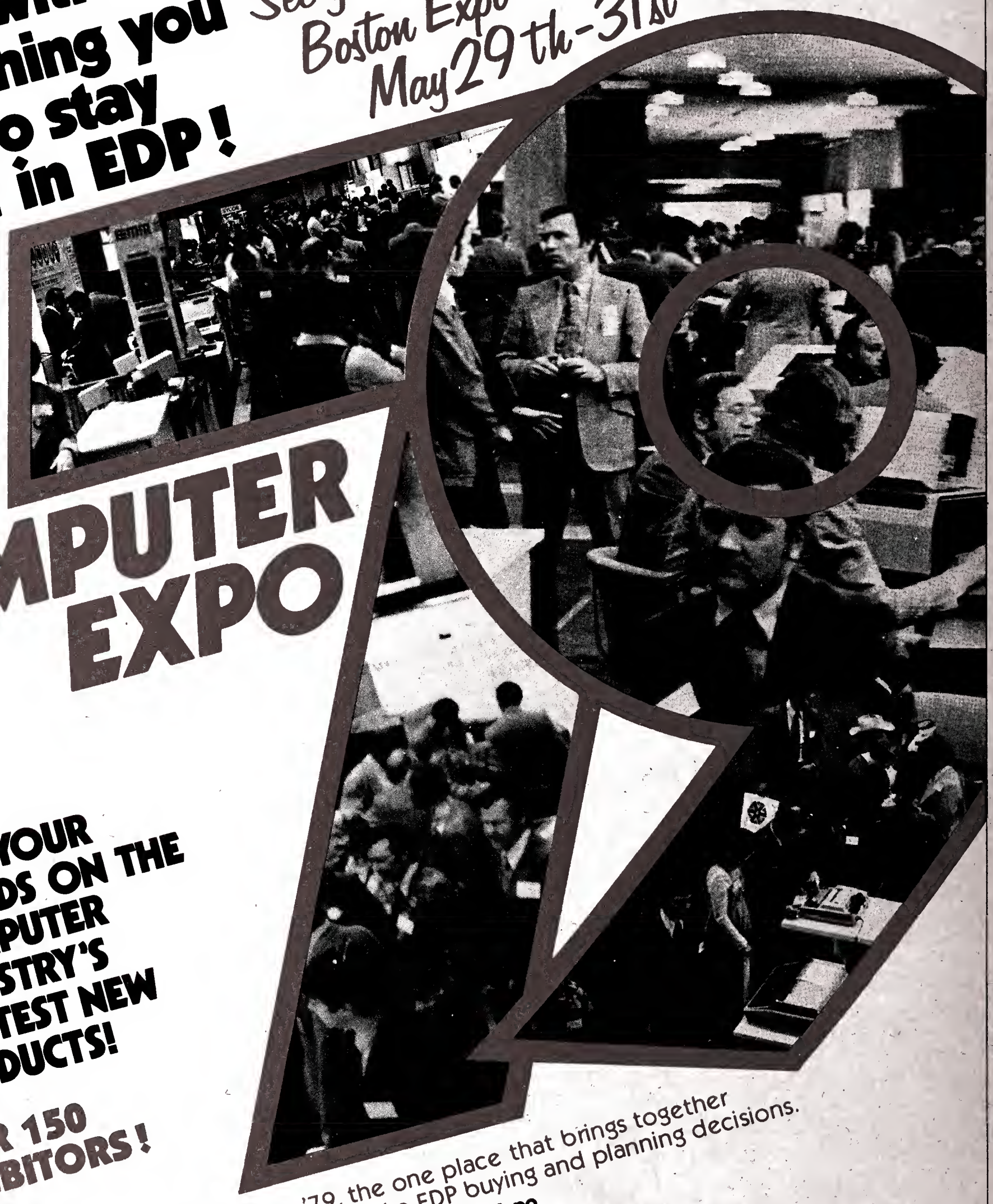

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After Three Months of Repair

Denver's License Renewal OCR at Work

By Marcy Rosenberg
CW Staff

DENVER — It took three months of diagnostic and repair efforts, but the Denver Motor Vehicle Division's $100,000 Burroughs Corp. S1800 optical character recognition (OCR) remittance processing systems are finally earning their keep.

The Motor Vehicle Division installed the systems to smooth and license renewal process during its December peak period and to aid its transition to year-round renewals. When first implemented, however, the OCR scanners misread account numbers and failed to credit almost 30,000 individuals for license renewal payments [CW, March 19].

Part of the problem related to the state forms used for mail-order renewals. The state's folding equipment required punched holes located next to the paper's scan line, often causing read errors, according to C. Robb Fuller, director of the Motor Vehicle Division.

Burroughs has since narrowed the read head band width to prevent it from scanning the hole, and Denver Motor Vehicle ordered new forms.

Also rectified were initial problems with data communications between the S1800s and an IBM 370/158 host computer located at the City and County of Denver's Data Services Division. The host maintains a master file of mail-order and walk-in renewal account and license tab numbers.

The system was configured so the S1800 would capture a day's transactions on an industry-compatible minifloppy disk. This data would then be transmitted to the host over dial-up lines at 4,800 bit/sec using IBM 3780 protocol.

"Because we had trouble getting modems installed and phone lines in, we had to physically transport the floppies to Data Services, where an IBM 3790 was to read the data into the host," Fuller recalled.

At first, the 3790 intelligent terminal system would not read data from the industry-compatible floppy disk, leading Burroughs to process the information on a B1800 system to create a disk that the 3790 would read.

Denver Motor Vehicle asked for an industry-compatible rather than a Burroughs minifloppy to serve as a backup to the data

(Continued on Page 50)

Experimental Circuits From IBM Approach Speed-of-Light Limits

By Howard A. Karten
CW Staff

YORKTOWN HEIGHTS, N.Y. — An IBM scientist here has developed a computer circuit so fast that it approaches limits imposed by the speed of light.

The circuit, based on Josephson technology, performs switching operations in as little as 7 picosec (trillionths of a second) and has a heat dissipation averaging 6 microW. In that length of time, electrical signals travel only .003 in.

Stressing that developments out of IBM's research labs are not necessarily intended to have commercial payoff immediately, an IBM spokesman estimated that it would be a minimum of five years — and possibly longer — before the device might see practical use.

If a computer incorporating the technology were to be built, the circuitry would have to be packaged within a cube measuring 1 cu in. to take advantage of its speed. In addition, since Josephson technology requires supercooling to achieve those speeds, the cube would have to be packaged in a unit "approximately desk-size," the spokesman estimated, to accommodate the cooling apparatus.

Josephson technology is named after Brian Josephson, an English theoretical physicist who, more than a decade ago, first predicted the superconducting effects to be expected at extremely low temperatures. Since then, numerous research efforts have verified his predictions, resulting in ever faster experimental computer circuits.

The research at IBM, for which the company has received a pat-

(Continued on Page 50)

Distribute Your Ideas

Everyone is talking about distributed DP. It is happening when a company installs processors at remote sites to transmit data back to the main DP center. It is happening when data bases reside in different pieces at different locations.

There are many ways to implement distributed DP, and these methods will be the subject of an upcoming special report in *Computerworld*.

Contributions to this special report are welcome. Articles should be four to five typed, double-spaced pages; supporting charts or artwork are also welcome.

Questions about the suitability of an article should be directed to Ronald A. Frank, who is the editor of this look at distributed DP.

Articles should be sent by June 11 to Frank at CW, 797 Washington St., Newton, Mass. 02160.

Space, Cost Benefits Cited

Micrographics Urged for Storage

By a CW Staff Writer

ATLANTA — Seekers of better methods of information storage, retrieval and dissemination should not overlook micrographics, according to Ray Carden, manager of records and micrographics at Westinghouse Electric Corp. of Philadelphia.

Speaking at the recent annual conference of the National Micrographics Association here, Carden maintained that micrographics can prove a cost-effective alternative to the reams of computer printouts plaguing many businesses.

"We must keep in mind that some of the tools that result in increased productivity also have some bad side effects," he said, noting that the same computers designed to process vast amounts of data also threaten to bury business and government under new mountains of paperwork. "Government and commerce are innundated with information, virtually all of it generated by word and data processing equipment."

But hardware is not the problem, he indicated; rather, it is mismanagement of paperwork. In most cases, information is poorly organized, cumbersome to handle, expensive to store and difficult to retrieve.

Micrographics cannot eliminate the amount of information generated each business day, but it can reduce the sheer volume to more manageable proportions, he pointed out.

For example, his own company developed a system combining the superiority of micrographics in many areas with the superiority of computers in updating and sequencing information, he said. The system supplies up-to-date information to personnel who service the company's several thousand installed steam turbines.

To aid its customers — typically

(Continued on Page 52)

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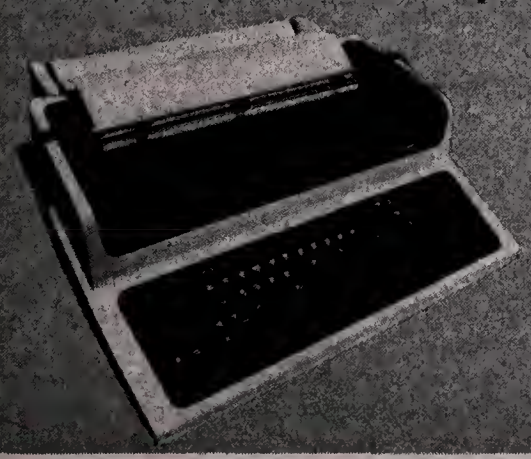

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Boosts Production, Cuts Costs

System Allows for 'Human' Side of Business

Special to CW

COLUMBUS, Ohio — An on-line system here is helping a manufacturer improve productivity and morale among its employees, while at the same time cutting down on costs.

"We have realized many benefits since we put the system on-line," according to George N. Ornstein, director of information system services for the R.G. Barry Corp.

"Productivity in our customer service and accounting departments is much higher, while costs are much lower. Customer service is better and management control is improved," he said. "Company personnel enjoy substantial job enrichment, and what was routine and tedious is now challenging and interesting."

Among the benefits of using the 1M-byte IBM 370/148 mainframe cited by Ornstein were a reduction in the number of people necessary to provide customer service and a drop in the cost of processing orders.

"We formerly had 22 people directly involved in order entry and customer service. Now, we have only 10, and those 10 handle more than double the order volume," he said.

In addition to the gain in productivity — from 10 to more than 40 orders processed per employee per hour — is a decline in the cost of processing and servicing each customer order. That has dropped from more than $5 per order with the old manual system to less than $1.50 per order today, he claimed.

Human Side of Business

Ornstein, who has a master's degree in psychology and a doctorate in man-machine systems engineering, said he is a strong advocate of the importance of personal relationships and human satisfaction in business.

"Because the system now handles all details and eliminates paperwork, our people have time to get to know the customers, understand their problems and patterns and establish a mutually helpful relationship. And we take full advantage of this convenience by assigning specific customer service and accounting departments. This has paid off handsomely in terms of happier customers and happier employees," he claimed.

The company's system, running under DOS/VS, has approximately 30 IBM 3277 or 3270 CRTs attached to it. These help employees retrieve information quickly and accurately and enable them to spend less time on routine matters and more on the unusual or troublesome accounts that make a job more interesting, he said.

"Instead of performing low-level clerical work that is routine, our employees can work on varied, exciting tasks — it's less mechanistic," he explained. "We have converted people from order enterers into true customer service representatives."

Although the number of employees involved in customer service was reduced, the employees were not laid off. "The company policy is that any system improvement will not result in a reduction in our work force; the employees were reassigned to other duties," he stated.

While businesses sometimes tend to look askance at employees with academic backgrounds, Ornstein's training was a distinct advantage for him and the company.

"The man-machine interface may be one of the significant differences between our shop and others; we try to be particularly aware of that and drive everything from the user viewpoint. It makes for much better systems," he said.

He split his own britches, but he had another pair!

Got a back-up computer facility?

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Circuits Offer High Speed

(Continued from Page 49)

ent, was conducted by Dr. Tushar Gheewala, a scientist at IBM's Thomas J. Watson Research Center here. It was reported at the recent First Specialty Conference on Gigabit Logic sponsored by the Institute of Electrical and Electronic Engineers in Orlando, Fla.

The research on the circuit spanned a period of two and a half years, Gheewala indicated, and used manufacturing techniques that are comparable in many ways to present silicon manufacturing techniques.

The heat dissipation aspect of the circuits is as important as their speed, the spokesman said. Since they typically generate only 6 microW, they can be packaged far more densely than transistors or chips, and a 1-in. cube of circuits would dissipate only several watts of heat.

However, at the temperatures at which the circuits operate — in the neighborhood of absolute zero, or -459°F — several thousand watts of power are required for the cooling apparatus.

The circuits are called "current injection logic." They differ in some highly technical aspects from earlier Josephson circuits in that they use a method called "direct injection" of current, as well as magnetic fields.

In addition to the higher speed, the circuit design permits operation over a larger range of input currents than other Josephson circuits, making it less susceptible to damage.

Denver Has OCR Running

(Continued from Page 49)

communications system, Fuller said. Now, data communications and backup are functioning normally.

The OCR systems, he added, are producing no read errors and presently rejecting only one out of 400 to 500 characters. Denver Motor Vehicle has also caught up with its renewal backlog and excused some 200 to 300 $10 tickets received by citizens because of the computer's failure to credit correct account numbers.

While the Motor Vehicle Division has just now paid for the equipment, Fuller said Burroughs did not bill the division until two to three weeks ago, after the systems were deemed acceptable.

Asked how much the equipment problems and downtime cost the city, he admitted, "We had to pay some overtime." Fuller stressed instead the cost savings derived from computerizing license renewal operations: "We were able to cut from 41 to 15 the number of temporary employees we hire during the December-January renewal period."

Moreover, the magnetic ink character recognition (Micr) code the S1800 prints on checks will give the city a 75% discount on bank handling fees and allow Denver Motor Vehicle to gain 14 days' investment potential on its monies every calendar week, Fuller noted.

He estimated the increased investment potential plus reduced personnel costs will save city taxpayers about $225,000 over the next three years.

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Micrographic Storage Urged

(Continued from Page 49)

electric utilities — the company created a microfilm data base, using a standard microfilm camera. Photographic techniques permit the company to include graphic data such as drawings, which could not be generated using a standard computer output microfilm (COM) system.

This data base, along with a COM-produced index, is maintained at 11 of the company's locations. The data consists of about 3,000 pages of approximately 300 million characters of data, such as the date of last revision and identification number.

Advantages Over On-Line

One particular advantage that micrographics has over an on-line system is that distribution is not limited by national boundaries, Carden asserted, noting Westinghouse's system has been expanded to Canada.

Although there are cost and logistical aspects to placing CRTs on everyone's desks, "everyone can certainly afford a microfilm viewing station."

For applications that are mainly oriented toward retrieval of low-volatility data, microtext is a good solution, Carden said. Straight microfilming with a camera can be done at a rate of approximately 600- to 2,000 page/hour. Assuming 1,000 char./-page, that is a rate of 600,000- to 2 million char./hour — compared with an average keypunch speed of 7,500 char./hour. And the data requires no verification, he noted.

Data storage is similarly lower in cost than disk or memory storage. Carden estimated the annual cost of 1K byte of data at approximately $150 for memory storage, 10 cents for on-line disk storage, .3 cent for off-line disk storage and .1 cent for microform storage.

However, the use of microtext for data storage is certainly not a panacea, Carden acknowledged. Obviously, micrographics cannot compare favorably with computers for updating or manipulating data, nor can individual fields within microtext be updated easily at present, although systems are now available that do allow for updating single pages.

Further, computer-maintained data bases can be automatically sorted or sequenced into any desirable sequence; unless aperture cards are used, source document microfilm becomes somewhat limited in this respect. And a standard source document microfiche data base must be hand-sorted.

But there are areas where microtext has a clear advantage, Carden noted. For example, at an estimated cost of .4 cent/page, it is significantly less expensive to produce than paper output at an estimated cost of 1 cent/page. And microfilm does promote wider distribution of data, in Carden's view, since a viewer can cost only $250 while an on-line CRT can cost about $10,000, including communications costs.

Therefore, on a cost-per-employee basis, it becomes practical to provide white-collar workers with viewers, since they involve a onetime cost of about 1% to 2% of an average employee's salary. The time difference between microform and a CRT is only a matter of a few seconds, Carden asserted.

There are other advantages to the use of microtext as well, Carden said. These include less downtime caused by hardware or software problems, availability of data 168 hours a week, the ability to access historical data in a cost-effective manner and the inherent audit trail provided.

System Protects DP Sites

CHATSWORTH, Calif. — Cardkey Systems has introduced a system for controlling entrance to and exit from sensitive areas, such as computer rooms.

The Interrogator 790 can control monitor and document the movement of up to 2,500 individual cardholders, the company claimed. In addition, the system can monitor hundreds of alarm conditions, ranging from burglar alerts to environmental system malfunctions.

More than a dozen remote access points can be controlled and monitored either directly, using two twisted-wire pairs, or remotely, using modems operating over telephone circuits, a spokesman noted.

The $8,000 central unit is completely interchangeable with alarm monitors, card readers and other system peripherals designed for Cardkey's Interrogator 880, he said.

Other features of the Interrogator 790 allow one or more doors in a system to be automatically locked and unlocked under time zone control; a maximum of eight separate time zones, with up to 280 time increments, can be programmed into the system.

To track attempts at unauthorized entry, these attempts can be displayed on the system's indicator panel and an alarm sounded to alert security personnel. A buffer memory system enables operators to recall illegal entry requests, alarm signals and malfunctions.

Cardkey Systems, a division of Greer Hydraulics, is at 20339 Nordhoff St., Chatsworth, Calif. 91311.

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COMMUNICATIONS

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Promotes Problem Solving

Main Goal of Itel Users Group: Idea Exchange

By a CW Staff Writer

CHICAGO — Choice, the recently formed common interest group for users of Itel Corp. mainframes, will serve both its members and its suppliers by encouraging feedback between the two, according to Choice officials.

In a recent interview, the officials — Denton McCormick, president of the group, and Frank Stubblefield, vice-president — discussed what they see as the five purposes of the group.

One aim is to provide an arena in which users can exchange ideas and techniques for overall efficient use of DP equipment. Another is to encourage and promote the discussion of problems so users and members can look for solutions to common problems, particularly as associated with (but not necessarily limited to) Itel equipment.

Next, the group aims to promote and develop what the officials called "educational inquiry into the DP field including — but not limited to — hardware, software, operations and development." The last two goals are to present to Itel the concerns of members in order to press toward satisfactory solutions to user problems and to develop special interest groups to investigate "any other topics that might occur" to users.

Although a vendor's software is the focus of most user groups, that will not be the case with Choice, according to Stubblefield, who is the director of information services at Rand McNally & Co. "A division of Choice has been set up to handle software, but our purpose is mainly to exchange information — to get feedback from Itel and give them some feedback," he explained.

Itel regards Choice as "a valuable part of our success," according to Ken Hunt, president of Itel's Computer Systems Division. "In the past two years, we have sold more CPUs than we envisioned in a five-year plan, and we've been able to do that because we've tried to remain sensitive to the needs of our users," he said in the interview. "If you keep the user happy, he ends up being your best salesman, through references, for example."

"Business-Oriented Motives"

After some initial aid from Itel the group became self-sufficient, McCormick said. However, "our motives are business-oriented; if we can't keep our user base happy, we will lose a valuable asset of a huge sales base," Hunt explained.

McCormick, manager of corporate Manager Information Systems for AM International, Inc. in Chicago, said, "Our direction will not be limited to hardware, software and operations. We might choose, for example, to get into discussions on distributed processing, the office of the future, word processing or any of a number of developing arenas.

"For example, there were rules of thumb about the DP expense as a percentage of sales; that figure is changing as we put more and more information on the computer. I think the nature of the DP manager is changing from the bearded guy wearing a T-shirt and sandals to a more traditional, business-oriented person."

CRO CONTROLLER

Book Explores Whys of DDP

ENGLEWOOD CLIFFS, N.J. — The whys and wherefores of developing distributed data processing (DDP) systems for business organizations are examined in a book available from Prentice-Hall, Inc.

The 320-page book *Distributed Processing Systems* outlines a selection of plans, policies, methods and control guidelines for adapting DDP to user requirements, an investment that could total upwards of $5 million.

Author Robert J. Thierauf illustrates how to develop marketing, manufacturing, accounting and physical distribution subsystems. Certain steps in the developmental process — physical requirements and alternatives, programming and testing, file conversion, parallel operations and scheduling equipment — are applied to various problem situations.

A comprehensive case study helps illustrate ways to apply flexible, reliable DDP systems. Included are strategies for providing data entry and inquiry at local levels, implementing smooth transaction processing and report generation for local or regional managers and setting up a DDP network at operating levels.

Network Approaches

To increase DP management productivity, the book also details several networking approaches and guidelines — for example, the pros and cons of hierarchical and fully connected ring networks and how to tie together any operation or part of the organization.

In addition, the guide presents sample applications of hardware and software combinations at the network level.

The book, available for a free 15-day trial, costs $18.95 from Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632.

Interactive System Saves $80,000/Year

City Upgrades Despite Proposition 13 Limits

BURBANK, Calif. — Despite California's tax-cutting Proposition 13 and the belt-tightening it has forced on Burbank's DP operations, the city has managed to upgrade its computer system and services and provide additional support, primarily with the help of on-line systems.

The city's IBM 370/125, purchased two years ago with help from federal revenue-sharing funds, was "quite a jump" over the city's previous system, according to C.E. Dettman, director of information systems for the city. That system, an 8K-byte IBM 1440, was replaced by the 512K-byte Model 125.

Attached to six IBM 3340 disk drives, the 370/125 currently performs all budget accounting for the city and provides officials with up-to-date information on the status of the city's 5,400 budget accounts. Operating interactively, the system supports 19 IBM 3277 CRTs linked via phone lines. The CRTs are located in several city departments, including the Public Service Department, the DP department and the fire, police and finance departments.

Despite the cutbacks forced by Proposition 13 and the mainframe's cost, the system has managed to save the city $80,000 in labor annually, Dettman stated. Part of the savings was achieved by eliminating some of the work necessary for capturing and recording data for accounting and reporting purposes.

"For example, we would keypunch information on treasure's receipts in the DP department and use it for printed reports for the finance department," he stated. "There, the information was extracted and recorded onto ledger cards with the bookkeeping machines. We would then take the ledger cards and punch the data again in order to run the financial reports."

Accounting for Utilities

Another problem the system solved concerned budget accounting for the city's Public Service Department, which operates the local electric and water utilities. The department had an accounting system, but it was not designed to provide budgetary control over the large number of electric and water construction projects in progress throughout the city.

"The department system took into account expenditures involved in various projects, but it had no way of knowing how many purchase orders had been issued that had not yet been charged to jobs. Therefore, there was no effective way of encumbering funds," Dettman explained.

In addition, while the city was able to break down the budget for general government departments into various categories such as salaries, materials and supplies and equipment rentals, the original accounting system for the Public Service Department did not provide such detail.

When the budget went to the city council, the council would see a detailed breakdown of every department's budget until it came to the Public Service Department, where everything would be listed under the general categories of 'electrical distribution' and 'water distribution.' Since these items represent about half the city's total budget, the need for a more detailed budget accounting system for the utility was obvious," Dettman said.

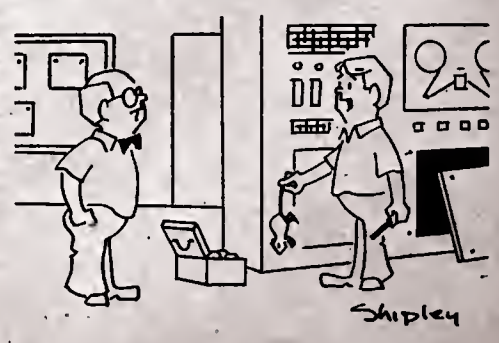
To solve these problems, the city turned to IBM's Budget Accounting Information System (Bacis), which is now Burbank's primary accounting system. Systems that were implemented earlier or were developed after Basic was installed have been interfaced to the system in order to take advantage of its interactive features.

On-Line System 'Vital'

The on-line system is now vital to Burbank's operation. "People can accomplish much more using the on-line terminals than they ever could with bookkeeping machines, desk calculators and typewriters, Dettman said. "We have been able to eliminate the labor of one full-time person in the area of writing accounts payable warrants, and had we attempted to do budget accounting manually for the public service department, the additional labor cost alone would have amounted to over $55,000 a year.

"Moreover, we have saved at least $14,000 a year in keypunching work that we no longer have to do for the finance department and Public Service Department.

"In short, we are doing a much better job for a lot less money, and today that's the name of the game — particularly in California, where the legislature and the taxpayers appear to be united in their determination to cut the sources of revenue for running our cities drastically," Dettman concluded.



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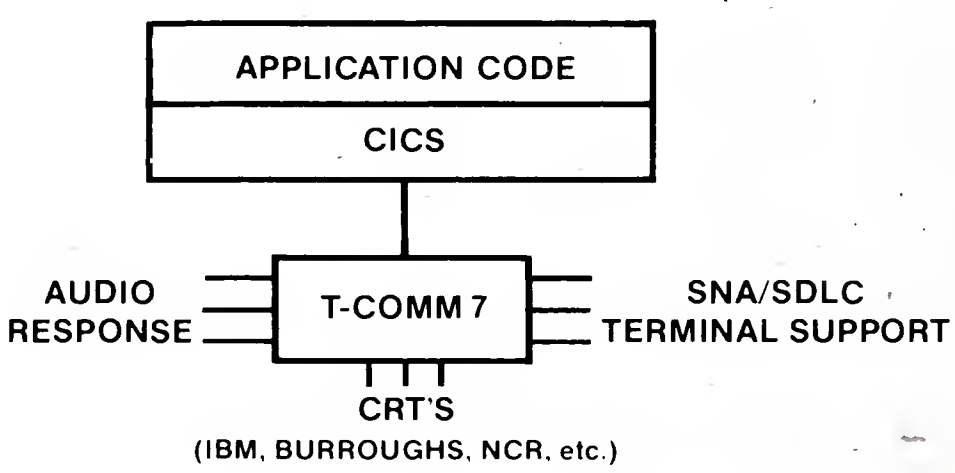

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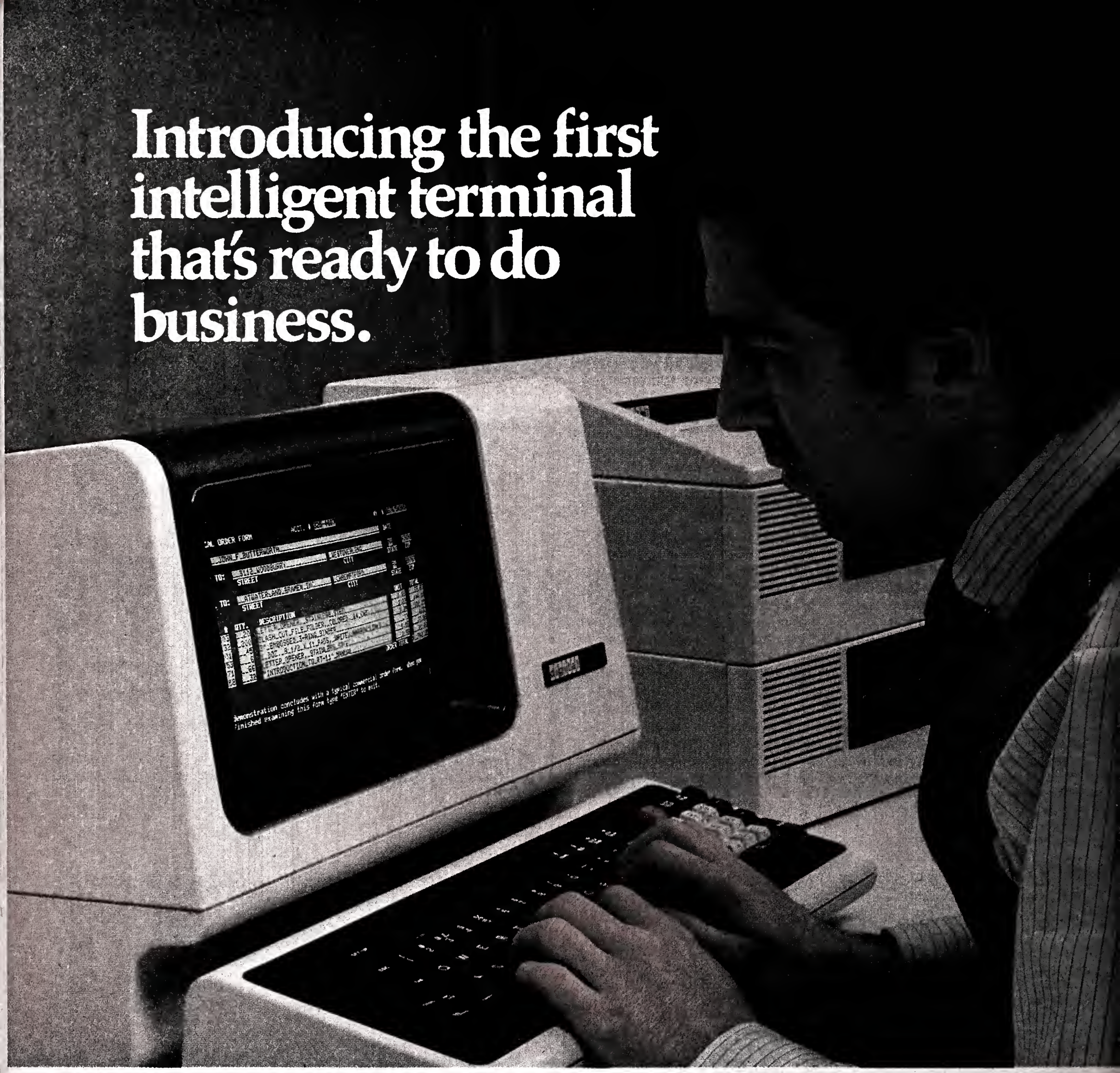

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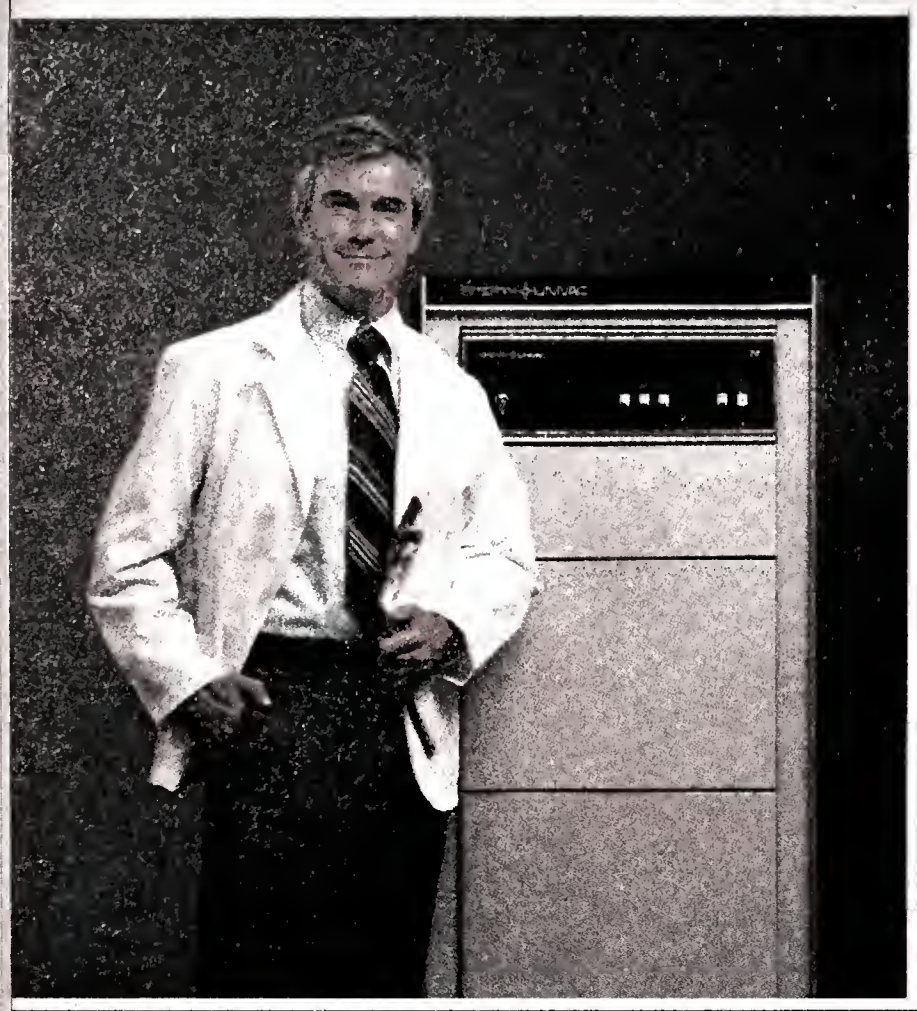

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OUR OEM CUSTOMERS KNOW WE DESIGNED IT JUST FOR THEM.

The Miniframe is customer microprogrammable. So an OEM can implement his own firmware packages. And with the many software packages we offer, the OEM can add all the bells and whistles he wants.

The Miniframe comes with our largest instruction set ever. So OEM's with their own software have much more flexibility in design.

The Miniframe speaks PASCAL, the powerful new language for scientific, commercial, and system programming that most competitive systems still can't speak. And of course, it also speaks COBOL, FORTRAN and RPG II.

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Naturally, system houses want all the features OEM's do. And more.

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The Miniframe brings systems builders a new query language called QL-77. It features inquire and report facilities. And interfaces directly to TOTAL®, the data base management system. So preprocessing and intermediate handling are a thing of the past. Finally, TOTAL also gives you complete data base access and file access security.

OUR END USER CUSTOMERS KNOW WE DESIGNED IT JUST FOR THEM.

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But we didn't stop there. We also pressed a few special hot buttons just for end users.

Consider QL-77, for example. End users will love our new query language because it reduces the amount of application programming. By storing query language procedures right in the data base file. Where they can be easily and quickly recalled and executed at any time.

Once again, SUMMIT, our new operating system, helps the end user handle transaction processing. Without any additional, expensive software. It's also the right answer for a multi-tasking, "fully-implemented" distributed processing system.

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Report Looks at User Options

Mini Cassettes, Cartridges Explored

By Brad Schultz
CW Staff

DELRAN, N.J. — "The first person to utilize a Philips cassette to record digital data will long be remembered for his deed, though his identity and the exact date . . . are lost in the annals of minicomputer history."

So begins an informative Datapro Research Corp. report entitled "Minicomputer Cassette and Cartridge Magnetic Tape Units."

"Probably some scientist or engineer happened onto the idea one night about 10 years ago, quite by accident, while watching his teenager record a Beatles record on an inexpensive cassette recorder," the report speculates. "This . . . might easily have occurred in dozens of homes and . . . probably explains why no one person has been singled out to receive credit for the contribution."

Whatever the origin of cassettes, they are among the most popular storage media in the minicomputer arena. Cassettes are easier to handle and store than paper tape, Datapro points out, and they also yield higher data transfer speeds and are reusable — hence less expensive, over the long haul — than paper tape.

The report summarizes the specifications of 84 cartridge and cassette tape subsystems available from 21 vendors.

Where applicable, each subsystem is identified by primary market, such as OEM or end user; type — for example, Philips cassette; and format — number of tracks, recording density and mode and compatibility with standards.

Among the numerous other points of distinction are total unblocked capacity, tape speed, data transfer rate, whether direct block addressing is available, packaging characteristics and price information.

Datapro also provides a concise generic description of cassettes, including the relevant standards posed by the American National Standards Institute (Ansi) and the European Computer Manufacturers Association (Ecma).

Ansi and Ecma mandate that each cassette contain at least 282 feet of .15-in.-wide tape, phase-encoded at 800 bit/in., the report states. Cassette cases must measure 4 in. by 2.25 in. by .5-in. and have four holes at the top and two hubs in the center.

Some Users Torn

The report observes that some users "are torn between purchasing a drive that handles a cassette and one that handles a cartridge." But that issue is fallacious because cassettes are actually a type of cartridge; the question really is which cartridge is best suited to the user's situation, Datapro declared.

The report is intended to help users find the magnetic tape subsystem most appropriate for their needs. But mag tape is not for everyone; some users may find disk storage a more cost-effective alternative, the research firm points out.

Tape is especially suited to applications in which the data is processed in the same sequence in which it was recorded. That is why tape serves well as a buffer medium in communications terminals.

The $12 report can be ordered from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

Floating Point Systems Adds Array Processor for Minis

BEAVERTON, Ore. — An array processor said to perform up to eight million floating-point operations per second and offering 38-bit precision and synchronous architecture is available from Floating Point Systems, Inc. (FPS).

A resident multitasking operating system (Super 100), coupled with a priority-interrupt structure, enables the FPS-100 arithmetic processor to address real-time applications, such as signal processing, image processing and process control, according to an FPS spokesman.

To simplify the generation of programs and expedite the system builder's development cycle, a Fortran compiler is available with the FPS-100. Other languages include an assembler (Apal) and the Vector Function Chainer.

Program development is aided with the FPS-100 simulator and debugger, the spokesman said. For applications requiring such algorithms as Fourier analysis, vector multiplication, convolution, filtering or matrix operations, a library of more than 250 Fortran-callable math routines is provided.

The FPS-100 may be configured with up to 64K 38-bit words, the spokesman noted. Auxiliary table memory (for the storage of numerical constants) is available in up to 4.5K 38-bit words of read-only memory (ROM) and 8K words of random-access memory (RAM). Program control memory of up to 4K 64-bit words may be configured.

A programmable general-purpose I/O processor is available for interfacing virtually any standard or custom peripheral device to the FPS-100, the spokesman continued.

Price for the FPS-100, including 1K words of program source memory, 2.5K words of ROM table memory and 8K words of main data memory, is $16,728 in OEM quantities of 100.

The FPS-100 will be available in the fourth quarter from Floating Point Systems, Inc., P.O. Box 23489, Portland, Ore. 97223.

Distributing Your DP?

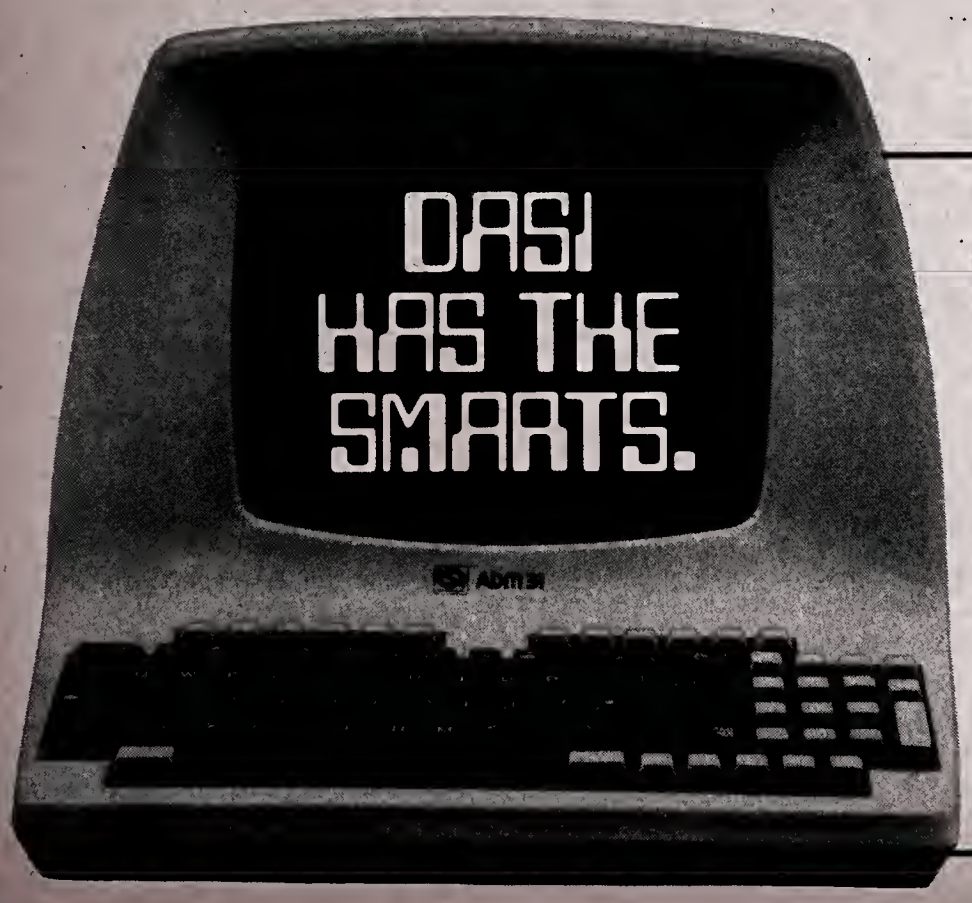
Everyone is talking about distributed DP. It is happening when a company installs processors at remote sites to transmit data back to the main DP center. It is happening when data bases reside in different pieces at different locations.

There are many ways to implement distributed DP, and these methods will be the subject of an upcoming special report in *Computerworld*.

Contributions to this special report are welcome. Articles should be four to five typed, double-spaced pages; supporting charts or artwork are also welcome.

Questions about the suitability of an article should be directed to Ronald A. Frank, who is the editor of this look at distributed DP.

Articles should be sent by June 11 to Frank at CW, 797 Washington St., Newton, Mass. 02160.



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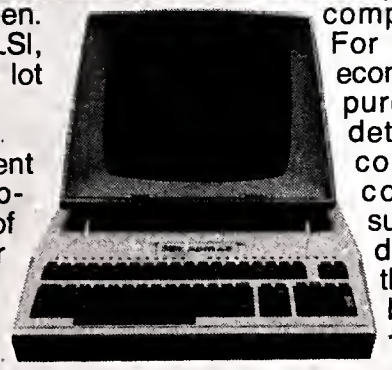

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Debugging Aid Offered For DG Nova 3 Series

ELMSFORD, N.Y. — A program debugging aid for the Data General Corp. Nova 3 series is available from Mini-Computer Systems, Inc.

The tabletop Model 2001 Programmer's Aide consists of a chassis with a printed circuit board, external cable and control panel. It operates by means of functional control that interrupts program execution after an instruction has been fetched from a single user-specified address, after a single user-specified address has been read and after such an address has been written.

After program execution has been terminated, the Model 2001 displays the last 64 successive memory locations, a spokesman said. The product provides dynamic monitoring within a single user-specified address during program execution.

Variable Addresses

User-specified addresses are completely variable and are selected using front-panel switches, the spokesman said. The legitimate address range will accommodate up to and including 32K memory locations.

Power for the unit is obtained from the Nova via the Model 2001's external cable, he added.

The Model 2001 costs $3,500 from Mini-Computer Systems, 399 Fairview Park Drive, Elmsford, N.Y. 10523.

Perkin-Elmer CPUs Get High-Density Tape System

EL SEGUNDO, Calif. — A group-coded recording (GCR) magnetic tape system for Perkin-Elmer Corp. CPUs that offers a density of 6,250 bit/in. is available from California Minicomputer Systems, Inc. (CMS).

The IBM/Ansi-compatible Model 6250 GCR system can greatly increase Perkin-Elmer sytem throughput by recording up to three times as much data per tape as 1,600 bit/in. transports, a CMS spokesman asserted.

The GCR tape capacity was said to provide three-to-one file compaction, reducing operator handling time for mounts and dismounts and cutting storage costs. The system's full media interchangeability with IBM and other mainframes will streamline the process of getting minicomputer-processed data into larger systems for further processing, the spokesman added, noting that no further coding, duplicating or reformatting for input is necessary.

The Model 6250 also performs simultaneous 2-track, "on-the-fly" error correction for greater data reliability and fewer reruns, the spokesman continued.

The 6250 contains one to four tape transports, an expandable formatter/-controller to control the transports simultaneously and a half-board host adapter that plugs into selector channels of any Perkin-Elmer CPU.

Other features reportedly include auto thread/load; self-contained take-up reel and quick-release hub for file reel mouinting; single capstan, vacuum column design; optimized write current; full differential reel path; and a full 180° capstan wrap.

The basic 6250 GCR includes one transport and costs $29,500. Each additional transport with its own separate cabinet goes for $13,500.

CMS is located at 605 N. Nash St., El Segundo, Calif. 90245.

System Copies, Tests Floppies

TUSTIN, Calif. — A programmable floppy disk initializer/copier sytem has been announced by Applied Data Communications.

The Floppy Copy IC-450 programmable media system can be used to test, initialize and make multiple copies of both standard and minidisk ettes, according to a company spokesman.

The IC-450 features an automatic stack/loader, which eliminates the need to manually load and unload diskettes individually, the spokesman said.

Compatible With T-400

Compatible with Applied Data's T-400 floppy disk test system, the IC-450 handles all IBM and most other industry standard and non-standard formats, single- or double-density, and one- or two-sided floppy drives, the spokesman claimed.

The IC-450 is said to be particularly suited to initialization by floppy disk media manufacturers, initialization and copying of diskettes by systems houses and computer manufacturers who distribute software updates on floppies.

The IC-450 system is available as a complete operating system, fully equipped with CPU, stacker/loader, CRT console and workstation desk. An interface for adding an optional Centronics Data Computer Corp. serial printer (60- to 120 char./sec) is included. An optional interface can accommodate the Teletype Corp. Model 40 line printer.

The basic IC-450, single or double density, single-sided system costs $19,950 for maxi or mini only and $29,500 for both. Double density will be priced slightly higher. The vendor is at 14272 Chambers Road., Tustin, Calif. 92680.

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NATIONAL —SPECIAL LEAR SIEGLER ISSUE—
INFORMER

DOLPHINS ATTACK MARINELAND!

May 21, 1979

Lear Siegler Stops Playing Dumb:

BRAINS BEHIND PROJECT Y EXPOSED

Will Lear Siegler Again Dominate the NCC? *Page 5*

★ ★ ★

Dumb Terminal Blueprints— Free Poster Inside! *Page 6*

★ ★ ★

Lear Siegler's Philosophy: We Hear You Thinking *Page 2*

★ ★ ★

Hollywood Report: Computers of the Stars *Page 10*

★ ★ ★

Burmuda Triangle Disappears Without a Trace *Page 20*

★ ★ ★

NCC Preparing for Throngs of Project Y Visitors *Page 29*

Data Products Division president William A. Terry, revealing some facts about the 415 Data Processor. Recent policy shifts caused several LSI employees to divulge Project Y secrets. NATIONAL INFORMER PHOTO

Lear Siegler startled the computer industry early this morning by revealing yet another Project Y peripheral, the 415 Data Processor.

National Informer readers will recall that last week, Cathy Raftery, Data System Product Manager, actually volunteered information concerning the 1000 Data System. Apparently, internal policy suddenly changed, and hard facts have begun to emerge without *National Informer* pressure. Rumors that this change of policy has affected the *National Informer's* credibility bother us no more than they ever did, however.

This morning, Data Products Division president Bill Terry explained in detail about the new 415 Data Processor. Terry, anxious to jump on the bandwagon, said the 415 is a Nova* 1200 compatible CPU with 32K, 16-bit words of memory (expandable to 64K words). Seemingly pleased and eager to talk, Mr. Terry said the system also includes an expansion chassis with 5 additional slots for 15″ square cards and a hefty power supply.

At one point, our *National Informer* reporter, insightful as always, asked Terry what else was in store for the NCC. But Terry only smiled and said, "Aren't you satisfied with the information you've already been given?" This cryptic comment looks to the *National Informer* as if it was meant to cover up something as yet unexplained.

Mr. Terry went on to say that for diagnostic capability, the 415 offers both QDEBUG (Quick Diagnostic Debugging Program), and firmware diagnostics.

Options available with the 415 include an I/O board, 32K words of add-on memory, a real-time clock, two asynchronous ports, a parallel printer port, a synchronous port, front panel, and 4 or 8 port multiplexers.

Pressed further, Terry would say no more, but held up a mysterious sheaf of papers and implied there

(Please turn to page 4, column 6)

*Nova is a registered trademark of Data General Corporation.

Improves Customer Service

Mini Traces Canned Goods Pouring Into Firm

NEW YORK — A food importer has gained better control over its purchasing and inventory, resulting in improved customer service, since it installed its own minicomputer.

Prior to 1974, Lissco Food Industries was not computerized. Keeping tabs on more than 200 different imported canned goods, from all over the world in a wide variety of sizes, was not an easy task for a firm using only pencils and paper. In addition, the company serviced about 3,000 institutional wholesalers and supermarkets governed by 35 independent food brokers, while trying to keep 25 warehouses stocked with the right inventory.

Although Lissco found it increasingly difficult to keep track of all its activities, in 1974 the tension eased a bit when the firm was acquired by Kanematsu-Gosho, U.S.A. (K-G), a diversified Japanese trading company.

K-G has previously contracted with Turnkey Sales & Leasing, Inc. to install a Microdata Corp. Reality minicomputer in its offices at the World Trade Center here and therefore was able to accommodate some of Lissco's data processing. When K-G expanded in several departments, however, all of which were serviced by the single minicomputer, Lissco's computerized reports were often received late and were of little value.

By 1976, Lissco had a serious need for its own computer. Acting on the positive experience K-G's Specialty Iron & Steel Division had with the Turnkey installation, Lissco decided to acquire a Microdata Reality system with 32K bytes of core memory, three CRT terminals, a 300 line/min printer and a tape drive from Turnkey.

Customized Software

Because of the individualized requirements of the food importing business, Turnkey had to develop customized software to fulfill Lissco's applications of purchasing, contract position, inventory position, order processing, invoicing, claims receivable, sales analysis and file maintenance, according to Jerry Bernstein, Lissco's vice-president and controller.

Such customized software resulted in a system that records customer open sales order and invoice data, while interfacing with the accounts receivable system. In addition, it automatically generates invoices, delivery orders and bills of lading, as well as recording sales data by customer, sales broker, inventory item and invoice number.

Lissco's system maintains inventory on a warehouse, purchase order, lot number basis for both good and damaged items and offers an aged analysis of inventory by item and warehouse. In addition, inventory receipts interface with the contract and purchase order systems.

All claims and claims payments are entered into Lissco's claims receivable system. Major system functions include the creation of open-claim receivables, the application of claim payments to open-claim receivables and the reporting of all claims by number.

The firm's purchase order system, which interfaces with the contract system, creates purchase orders and applies this data to the contract system. The system also reports purchase orders by vendor, inventory item and country of origin.

Lissco's sales analysis system reports sales statistics by customer, inventory item and sales broker and also reports gross profits. In addition, it generates sales broker commission statements and end-of-year commission reports.

Generates Reports

The system has a report-generating capability, Bernstein noted. Purchasing reports indicate the commodity, supplier and origin country, while inventory reports detail the aging of goods and daily inventory by commodity and warehouse.

Two long-range developments are in Lissco's future, according to Bernstein. The company's entire accounting system, now being processed by K-G, will eventually be put on Lissco's own computer. Moreover, Bernstein would like to place CRTs in all Lissco's warehouses so that Inventory Position — shipping status information — will be available on demand.

"The results [of the installation] have been better control over purchasing and inventory with a proportionate reduction in the amount of slower moving inventory being warehoused," Bernstein noted. "Through the system's generated reports, we are able to forecast our inventory requirements months in advance."

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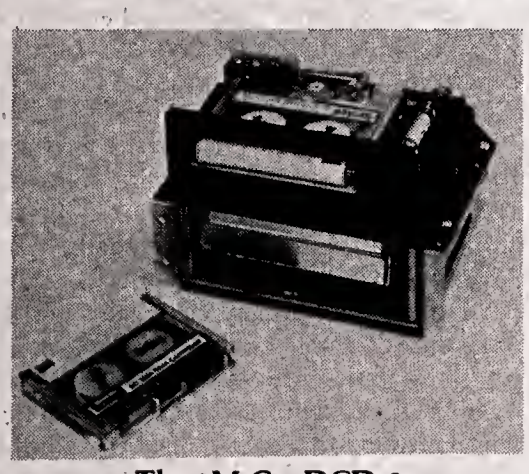
Runs on Two Tracks

Cartridge Drive Operates at 1,600 Bit/In.

ST. PAUL, Minn. — A dual-track cartridge drive that reportedly operates at a density of 1,600 bit/in. on two tracks has been introduced by 3M Co.

The DCD-2 cartridge drive permits a capacity of up to 672,000 8-bit bytes using unformatted phase encoding recording, according to a spokesman.



The 3M Co. DCD-2

Standard DC100A cartridges are used.

A low error rate is said to be enhanced by the unit's .068-in. write and .058-in. read track widths. Either of the dual tracks may be used for either function, the spokesman said.

Completely bidirectional, the DCD-2 operates at 30 in./sec for reading and writing functions, while search functions may be executed at either 30- or 60 in./sec. A single-voltage power requirement (+12Vdc) is incorporated in the DCD-2 design.

Available in evaluation quantities, the DCD-2 cartridge drive costs approximately $420, with a discount to approximately $320 in quantities of 100.

The 3M Co. can be reached through Box 33600, St. Paul, Minn. 55133.

DEC Upkeep Described

PENNSAUKEN, N.J. — A business manager's guide to the maintenance services offered by Digital Equipment Corp. is now available from Alltech Publishing Co.

Digital Equipment Corp. Maintenance describes the contract maintenance services DEC offers and how the contracts differ; the noncontract maintenance services DEC offers; and DEC's procedures for reinstating maintenance of a system it is not currently maintaining.

The guide also explains DEC's special maintenance services.

The report costs $5 prepaid from Alltech Publishing, 212 Cooper Center, Pennsauken, N.J. 08109.

Course to Cover Mini Selection

NEW YORK — "Design and Selection of Minicomputer Systems" will be the topic of a course given here June 11-13 and in Boston July 16-18 by the American Management Associations (AMA).

The course is intended for directors of management information systems (MIS), systems personnel and executives in small- and medium-size organizations who are considering computerization for the first time.

Course instructors will explain what minicomputers can and cannot do and will discuss the best method of acquiring a mini. In addition, instructors will examine the technical considerations that must be understood when evaluating a mini system.

The course will also show how to anticipate and deal with political, personnel and organizational problems in implementing a minicomputer system. Three special workshops will offer an opportunity to test the attendee's understanding of the material presented.

Attendees will receive a free copy of *Minicomputers: Low-Cost Computer Power for Management* by Donald P. Kenny. The registration fee for the course is $480 for AMA members and $550 for nonmembers.

For groups of three or more people belonging to the same organization, the cost per person is $410 for AMA members and $465 for nonmembers. Discounts for larger groups are also available.

The AMA is at 135 W. 50th St., New York, N.Y. 10020.

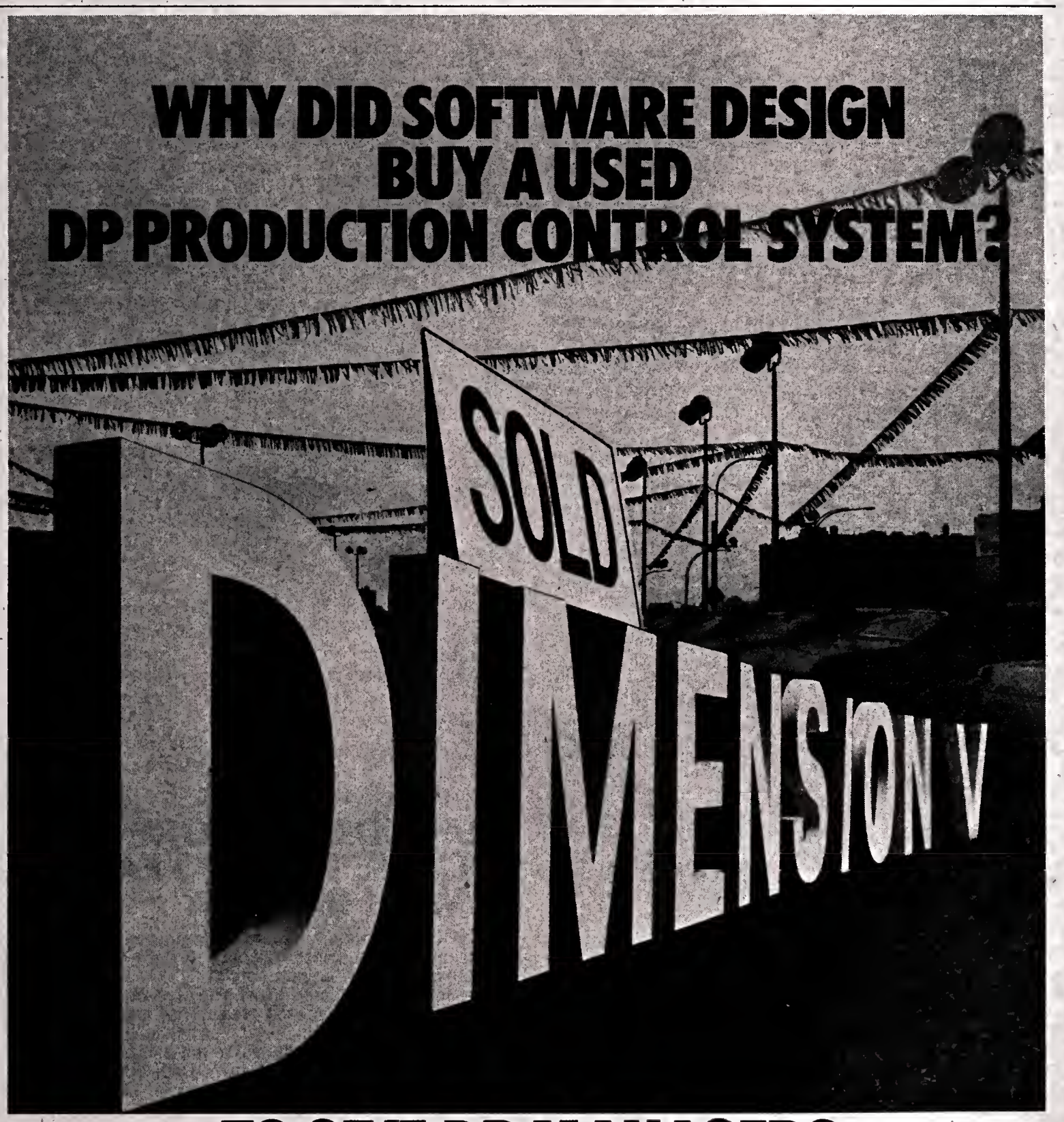
Pro-Log Unveils Generic Module

MONTEREY, Calif. — A generic personality module that enables Pro-Log Corp. Series 90 programmable read-only memory (Prom) programmers to program the Monolithic Memories, Inc. programmable array logic (PAL) family of bipolar LSI integrated circuit devices has been announced by Pro-Log.

Designed to permit programming of all generic PAL device types, the Model PM9068 module is said to provide the control lines and timing necessary to list, program, duplicate and verify the devices using Pro-Log's Series 90 Prom programmer master control units.

The PM9068 contains separate master and copy sockets, all of the PAL programming electronics and configurators that automatically adapt the personality module to the correct PAL bit structure and device size, a company spokesman said.

All configurators needed to program the PAL series devices are provided with the PM9068 at no extra cost. The PM9068 costs $950 from Pro-Log, 2411 Garden Road, Monterey, Calif. 93940.



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Ink-Jet Printer Features Dual Speeds

FRANKLIN LAKES, N.J. — IBM's Model 6640 dual-speed document printer provides a production print speed of up to 184 char./sec burst rate and a base print speed to 92 char./sec burst rate.

The ink-jet printer also offers seven resident electronic-type fonts. The single-speed 6640 offers just five fonts, a spokesman noted.

Ink-jet printing creates high-quality images from tiny ink droplets directed electrostatically to the paper, he explained. Pitch, type styles, tabs, margins and spacing of the triple-pitch machines are controlled electronically. Justified and unjustified text and different type styles can reportedly be mixed within the same document.

Under a new monthly use pricing plan, the dual-speed 6640 is available for 24 months for $550/mo plus 2.5 cent/sheet up to 7,000 sheets and 1.2 cents for each additional sheet over 7,000.

Monthly rental charges for the single-speed 6640 have been changed to $725 and $690 for 24-month and 36-month leases.

The dual-speed 6640 costs $27,130. First shipments are slated for the third quarter from IBM's Office Products Division, Parson's Pond Drive, Franklin Lakes, N.J. 07417.

A/D Data Acquisition Unit Offers 250 KHz Speed

CANTON, Mass. — An analog-to-digital (A/D) data acquisition system offering 250 KHz throughput rates, high channel density and compatibility with most minicomputers and high-speed 16-bit microcomputers is available from Datel Systems, Inc.

The PDAS-250 is claimed to be the first system to combine 12-bit binary A/D-D/A resolution, 250 KHz throughput and channel density of 256 A/D channels per housing.

A front-panel binary controller with data and channel LED indicators and toggle switches allows local manual access to the system, a spokesman said. The front panel can be disabled from the local mode so the PDAS-250 is controlled by the host computer in the high-speed remote mode.

Up to 256 single-ended or 128 differential A/D channels are available co-resident with up to 32 D/A channels, the spokesman noted.

The PDAS-250 consists of an A/D section with a solid-state multiplexer, sample and hold section, successive approximation 12-bit A/D converter, data output register and gatable buffer.

Random and sequential channel address logic, mode controllers, status registers, front panel and ac line power supply complete the system.

The system employs an overlapped conversion technique whereby previous A/D conversions are stored in a data register while the multiplexer switches and acquires the next channel, the spokesman said.

A "very unusual" option, according to the manufacturer, is Simultaneous Sample/Hold, wherein up to 64 A/D channels can be sampled at the same time (+− 1 nsec) and then rapidly digitized and transmitted to memory.

Prices start at $3,190 for a PDAS-250 with 32 A/D channels, Datel said from 1020 Turnpike St., Canton, Mass. 02021.

Series/1 Linked With Printers

ANAHEIM, Calif. — A microprocessor-based line printer controller designed to provide non-IBM printers with Series/1 compatibility has been announced by Mini-Computer Systems, Inc. (MCS).

The Model 2320 provides current compatibility for Centronics Data Computer Corp., Printronix, Inc. and Dataproducts Corp. line printers as peripheral subsystems.

The controller consists of one printed circuit card in the Series/1 CPU and a cable connected to the printer.

The Model 2320 reportedly enables operational control of the associated printer as a peripheral subsystem utilizing standard Series/1 programs.

Because of its microprocessor base, the controller will permit utilization of any unique functional features via application software, according to an MCS spokesman. It costs $1,950, with quantity discounts available from the firm's Peripheral Equipment Division at 2259 Via Burton, Anaheim, Calif. 92806.

Forms Access Printer Has Teletype Device

TORRANCE, Calif. — An impact printer designed for use as a firm's second unit located where immediate data access is important — warehouses, shipping docks, reservations systems or truck weight stations — is available from Local Data, Inc.

The Quiet 300 forms access printer, which handles up to six-part forms, offers a Teletype Corp. Model 40 print mechanism and 80-col tractor feed.

The Quiet 300 prints at 300 line/min with a 63-character Ascii set and at 500 line/min with a 48-character set. It costs $3,910 from Local Data, Suite 706, 2701 Toledo St., Torrance, Calif 90503.

Small Business Systems Surveyed

Microdata Reality Gets Top User Rating

Microdata Corp.'s Reality, Basic/Four Corp.'s Model 400 and the IBM System/3 models 6, 10 and 15 reaped the highest marks in Management Information Corp.'s (MIC) fourth annual small business systems users survey.

To assess how well small business systems are meeting users' needs, MIC polled 568 companies that use 689 small business CPU's.

Each respondent was asked to subjectively rate the vendors and their products on performance (whether stated equipment specifications have been realized), reliability (uptime vs. downtime), ease of use (amount of time necessary to train new personnel), service (maintenance) and vendor support (such as advance training and program assistance).

A four-point rating scheme was used (1 = poor, 2 = fair, 3 = good, 4 = excellent). The survey results were given as averages of the ratings assigned to each product in each of the five categories.

The Microdata Reality, Basic/Four Model 400 and Model 15 were the only small business systems to receive ratings of 3.0 or higher in all five categories.

Taking the average of all five categories, the Microdata Reality topped the field with a score of 3.66 (based on 27 respondents using 55 units). The Reality earned 3.8 in performance, 3.8 in reliability, 4.0 in ease of use, 3.4 in service and 3.3 in support.

Based on nine respondents with nine units, the average for the IBM System/3 Model 15 was 3.6. This system was rated 3.6, 3.8, 3.6, 3.7 and 3.3 in performance, reliability, ease of use, service and support, respectively.

Eight users with 17 Basic/Four 400's gave that system an overall rating of 3.5. In performance, reliability, ease of use, service and support, the system was rated 3.5, 3.4, 3.8, 3.4 and 3.4.

Following this order, the IBM System/3 Model 10 was rated 3.3, 3.5, 3.3, 3.3, and 3.3, respectively, by 34 users with 45 units. The System/3 Model 6 received 3.4, 3.7, 3.7 and 3.1 ratings in performance, reliability, service and support, respectively, by eight users with eight units.

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Reality by Microdata

Micro Potential Great for Office of Tomorrow

By Tim Scannell
CW Staff

TORONTO — The microcomputer is destined to play an important role in the future of office automation, according to a panel of experts here at the recent Data 79 conference. However, its days as a hobbyist's toy are numbered.

Addressing an audience of computer industry executives, the panel discussed the present state of microprocessor technology, including its possible effects on the office of tomorrow. One speaker likened its potential to that of the factory during the industrial revolution.

Just as factories increased materials production and improved socioeconomic conditions in the early and later stages of the industrial era, microcomputers will turn "the dark, satanic office into a happy place," Dr. Herbert R.J. Grosch, an independent consultant, stated.

Hinting that he believes today's offices are on the verge of total automation, Grosch predicted that microcomputers will relieve workers of such "cruel tasks" as letter sorting, letter handling and even letter writing. Office microprocessors will control everything from word processing to spelling, but the computers will be contained in typewriters, copiers and other office machinery rather than stand alone, Grosch said.

The California-based consultant denied that the influx of more and more computers into the office environment would eventually have a dehumanizing effect, as some critics have charged. "We're here on earth to have happy lives, not to emulate machines," Grosch observed. The whole point of office automation is to "free our people to be more creative, and not to relegate them to basement typing pools or electronic closets."

Grosch cautioned vendors not to be too concerned with machine efficiency or cost savings, but to use their energies to produce equipment that would enhance the quality of the office product. Executives would rather have a machine that improves the content of a letter than "grind out the same old junk for half or one-third the price" he noted.

'Electronic Hula Hoops'

Ian P. Sharp, president of I.P. Sharp Associates and also a member of the Data 79 panel, had a bleak opinion of personal computers, referring to them as soon-to-be forgotten "electronic hula hoops." Sharp claimed that the average at-home microcomputer system has an interest lifespan of approximately two weeks. This period might be extended to four weeks if a communications ability were added.

Radio Shack TRS-80 Gets Accessories

• Printer Saves

FORT WORTH, Texas — Radio Shack has introduced the TRS-80 Quick Printer II for producing low-cost hard-copy output on 2-3/8-in. wide, aluminum-coated paper.

The Quick Printer II prints both upper and lower case characters, as well as double-sized characters and double-spaced characters to allow for special effects such as titling pages or printing headings.

Automatic wrap-around prevents data loss as a result of overflow when the text exceeds the maximum line length, the firm said. The printer is software-selectable for 16- or 32 char./line and produces 120 line/min or 64 char./sec.

The character set is a modified subset of Ascii, with 96 upper and lower case characters, a five by seven dot matrix and six line/-in. vertical spacing. It can produce all 32 Ascii control codes in addition to codes for the printed characters.

The printer can be used with units other than the TRS-80, according to the firm, and features TRS-80, RS-232C and 8-bit parallel interfaces. The printer can be connected directly to the TRS-80 CPU or, with optional cable, to the TRS-80 expansion interface.

The TRS-80 Quick Printer II costs $219 and is available from Radio Shack computer centers and participating Radio Shack stores and dealers.

• Output 'Spoken'

FORT WORTH, Texas — The TRS-80 voice synthesizer was recently introduced as an accessory for Radio Shack's TRS-80 microcomputer to translate the computers output into recognizable intelligible speech.

The synthesizer includes volume control, a built-in speaker and a cable assembly that permits plug-in connection to TRS-80 systems, a spokesman said.

Programming the TRS-80 for speech is done in Basic, and about 60 phonemes, or units of speech, can be entered via the computer keyboard. These phonemes will allow the computer to speak in foreign languages or with an accent by integrating the various phonemes to produce the desired sound, according to the firm.

The voice synthesizer can be used in many applications. In education, for example, it can be used to supplement the displayed video information for variety of disciplines including spelling, reading, language arts and mathematics.

The TRS-80 voice synthesizer costs $399, complete with instruction manual and demonstration cassette. It can be ordered through participating Radio Shack stores and dealers nationwide. Radio Shack headquarters is at 1300 One Tandy Center, Fort Worth, Texas 76102.

• Listings Have Zip

IRVINE, Calif. — KFS80, an indexed sequential access method facility, and Maillist, a data base for mailing lists for use with the Radio Shack TRS-80, are being offered by Automated Resource Management, Inc.

KFS80 provides keyed and sequential access to multiple files with records of up to 240 bytes. A relatively constant number of disk accesses is required to reach a record, no matter how large the file grows, the firm claimed. Sectors are dynamically added to the file as necessary.

KFS80 can be used for inventory, accounts payable, and accounts receivable. The system includes the KFS80 subroutine, a utility program for file maintenance and a demonstration program that permits operator control of KFS80 commands.

It is coded in Basic and requires less than 8K bytes of memory. Minimum configuration is a two-drive 32K-byte system.

Maillist provides the ability to add, delete and change records. Reports and mailing lables can be generated, and optional secondary files automatically maintain Zip Code and data files. Reports and mailing labels may be sorted by last name, Zip Code, date, or date two.

Each record has 30 attributes for selection of records. The attributes are defined by the user and symbolically referenced by the operator.

Each data base may use its own symbols. A "mask and value" mechanism permits selection of records for reports and labels. Particular attributes or combinations may be specified in the selection of the report entries.

The system includes the Maillist application program, the Mailman file maintenance utility and a test data base called Mailtest. Minimum configuration is a two-drive 32K-byte system.

Both KFS80 and Maillist are on diskette and cost $49.95 and $39.95 respectively. Automated Resource Management, can be reached through P.O. Box 4353, Irvine, Calif. 92716.

Micro Chips

Micro Software Meet To Be Held in Caribbean

A participatory workshop on microcomputer software will be held at a Caribbean resort during Christmas week.

Topics of discussion will include systems and application software as well as professional, educational and small business programs. Volunteers are needed to organize each interest area. Families are welcome.

More information is available from Dr. Andy Bender at 400 Old Hook Road, Westwood, N.J. 07675 or Dr. Jeff Brownstein, at 2 Tor Road, Wappingers Falls, N.Y. 12590.

Store Selling Sol Micro

The 70 Computerland stores throughout the U.S. have begun selling and servicing the Processor Technology Corp. line of Sol microcomputers.

Thinker Toys Moves

RICHMOND, Calif. — Thinker Toys, Inc., a manufacturer of S-100 products, has moved from Berkeley to larger quarters at 5221 Central Ave., Richmond, Calif. 94804.

System Manages Small Inventories

SASKATOON, Sask. — Custom Computing Systems, Inc. is offering an interactive Tiny Business Inventory Management System, as well as accounts receivable and accounts payable systems for the Apple Computer, Inc. Apple II.

Each software package requires a minimum of 48K bytes, one disk drive, an optimum system configuration of two disk drives and floating-point firmware.

The Inventory Management System supports 820 separate inventory items and 100 suppliers. Heuristic techniques monitor reorder levels and quantities to assist the user in evaluating stock sales. The accounts payable and accounts receivable software handle 150 accounts each.

All software packages have password protection to provide security on sensitive portions, the firm said.

The Inventory Management System costs $100, and the accounts receivable and accounts payable systems cost $75 each from Custom Computer Systems, Inc. at 204 Second Ave., N., Saskatoon, Sask., Canada S7K 2B5.

Micro Based on 8085 Puts Focus on Application

MOUNTAIN VIEW, Calif. — Pragmatic Designs, Inc. has introduced CPU-1, an 8085-based microcomputer designed for dedicated control applications, which allows users to concentrate on their overall application, rather than on detailed microcomputer design.

CPU-1 contains a 3 mHz 8085 microprocessor. The basic system contains 256 bytes of random-access memory (RAM), 22 I/0 lines, a serial I/0 port and a programmable counter/timer.

The system has power on reset and a manual reset button. The 8085's vectored interrupt structure is supported.

The CPU-1 card has sockets for from 1K- to 4K bytes or erasable programmable read-only memory (Eprom). For users with larger applications, the CPU-1A offers all the features of the CPU-1 expanded to 512 bytes of RAM, 44 I/O lines and two programmable counter/timers.

System I/O and control traces are bussed to pads adjoining this area, allowing users to customize the CPU-1 to fit their specific applications. CPU-1 has space for an on-board power supply with +5 and +12V outputs.

Applications programs for CPU-1 can be developed with any 8080/8085 development system. It also can work with Pragmatic Design's DBM-1 debug memory card.

CPU-1 costs $125 for a kit and $175 assembled; CPU-1A costs $160 for a kit and $210 assembled. Pragmatic Designs is at 711 Stierlin Road., Mouintain View, Calif. 94043.

Software Tapes Include 'Pie Lob,' 'Haiku'

MORRISTOWN, N.J. — Creative Computing Software is offering a line of small computing software on 21 tape cassettes and two 8-in. floppy disks.

Tapes and disks are available in three areas: games and recreation, education and self-learning and self-appraisal.

Programs include "Life Expectancy," which allows a player to explore different life styles and compute life expectancies; "Psychotherapy," which, with the help of the computer, helps analyze symptoms and behavior to determine mental health; "Alcohol," which shows the effect of alcohol on behavior; "Adventure," which lets a player explore an almost endless maze of caverns; "Pie Lob," in which two players lob custard cream pies at each other; and "Haiku," in which the computer helps the player compose poetry.

Tapes are available for the Apple Computer, Inc. Apple II, the Commodore Business Machines, Pet, the Ohio Scientific, Inc. 1P and the Radio Shack TRS-80. Floppy disks run on any CP/M operating system. Each tape contains four to seven programs, and each disk contains 51 programs.

Most tapes sell for $7.95, and the CP/M disks sell for $17.95 from Creative Computing Software at P.O. Box 789-M, Morristown, N.J. 07960.

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Assembler Runs On 6800 Micro

W. LAFAYETTE, Ind. — Designed to operate under the Flex disk operating system on the 6800 microprocessor, the 6809 cross assembler from Technical Systems Consultants, Inc. is fully compatible with both 6809 and 6800 mnemonics.

Existing 6800 source listings can be directly reassembled using the device to produce executable 6809 object code. The cross assembler, which also is 6801 compatible, can support all standard mnemomics and directives including macros and conditional assembly. Warning messages are supported and may be enabled or suppressed.

The software is available in binary form on a Flex 8- or 5.25-in. compatible disk. The manual and disk are available for $100 from Technical Systems Consultants at Box 2574, West Lafayette, Inc. 47906.

Award Indicates Micro's Growth

BELLEVUE, Wash. — Microsoft 8080 Basic was the first microprocessor software product to win the international Computer Programs, Inc's. (ICP) million dollar award.

The award was presented to Microsoft at the Eighth Annual ICP Million Dollar Awards Ceremony in New Orleans on April 4 and 5.

Each year ICP honors companies whose software products reached milestones from $1 million to $50 million in sales. Because the awards are traditionally dominated by software marketed to large computer installations, this year's recognition of Microsoft Basic indicates the substantial growth of the microprocessor industry, Paul Allen, vice-president of Microsoft, noted.

Microsoft, which has specialized in system software for microprocessors, now employs 18 people and despite its small size sells its software to many of the large micro and mini makers.

Predicted at $5.3 Billion in '84

Graphics Market Seen Finally Ripening

By William Nisen
Special to CW

NEW YORK — Computer-generated graphics date back to the origins of electronic data processing, and ever since that time enthusiasts have been forecasting a market boom. Now, after several false starts, computer graphics has "reached puberty for the third and final time," according to Peter G. Cook, graphic display division market information and research manager at Tektronix, Inc.

Tektronix has installed several thousand graphics terminals worldwide. "Computer graphics now represents 22% of Tektronix's business, equal to $160 million," Cook said, "and we are in only a small piece of the field."

Such enthusiasm over the future of computer graphics was the prevalent attitude at the First Annual Assessment and Forecast of Computer Graphics, a three-day conference sponsored by market researchers Frost & Sullivan, Inc. and held here recently. The optimism held up even after some industry speakers pointed to serious deficiencies in the state of the art, including the absence of inexpensive hard-copy color equipment and a dearth of both user-oriented software and knowledgeable, adequately trained sales personnel.

However, most speakers viewed these inadequacies as business opportunities that would eventually be overcome, leading to a $5.3 billion market by 1984 — a 21% compounded annual growth rate, according to computer graphics consultant Carl Machover, the Frost & Sullivan seminar chairman.

"A decade ago, no supplier was doing more than $10 million a year in this business," Machover said. Today, at least a dozen suppliers do this volume or more, and the installed base of graphics terminals through 1978 totaled 50,000 units, some 70% of them in the U.S.

Great Drop in Cost

The hefty growth rate was predicted because of the continuation of technology trends that have impacted all of computerdom — steeply declining memory cost per bit and an advancing microprocessor state of the art. Neal Johnson of graphics terminal supplier Vector General Corp. depicted the price/performance improvement in computer graphics technology.

Based on generating a .25-inch vector, the cost of refresh graphics in 1970 ranged between $5 and $13 to achieve a three-dimensional picture. That cost has been reduced to between $3 and $4 today. For two-dimensional pictures, the 1970 cost ranged between $4 and $7, declining to $2 maximum currently.

(Continued on Page 69)

NCR Deals Severe Blow to Adds By Ending Consul 580 Purchases

By Marcia Blumenthal
CW Staff

HAUPPAUGE, N.Y. — NCR Corp.'s recent decision to manufacture a terminal previously purchased in huge quantities from Applied Digital Data Systems, Inc. (Adds) was a blow to the guts of Adds' business.

The Consul 580, used in NCR's Spirit system, accounted for about half of Adds' fiscal 1978 sales of $17.7 million to NCR. Adds' revenues last year totaled $46.9 million.

During Adds' first 1979 quarter, the terminal represented $2.5 million of Adds' $5 million in sales to NCR. Total revenues for the quarter were $11 million.

The loss of the NCR contract will not hurt Adds' 1979 financial results, but in fiscal 1980 the company will have to make up a $9 million shortfall, Leon Meshel, treasurer, reported. Although, NCR will begin manufacturing a comparable terminal product in October, Adds' contract runs until Jan. 1.

To make matters worse, NCR eventually intends to manufacture replacements of the three other terminal models it buys from NCR. However, NCR said "we expect to continue to purchase these from Adds for some time to come."

Robert A. Degan, Adds president and chief operating officer, said company executives will "meet with NCR in the near future to discuss the extension of the current contract covering these models."

NCR contributed about 38% of Adds' total revenues last year. The firm has about 20 other customers that each contribute between 1% to 5% of the company's revenues, Meshel said.

For the past three years, Adds has been pointing out to both shareholders and financial analysts the risk of servicing the OEM market. "It's always a function of economies of scale. We recognized this would happen one day," Meshel said.

In anticipation of that day, Adds has been expanding its sales and marketing force during the past year to minimize the dependence on one customer. Although Meshel offered no hard numbers, he said the company has been hiring product managers and support and field engineering staff.

Moreover, the company has doubled its research and development effort during the past year and broadened its product base, Meshel said. Adds introduced six products at Interface '79 in Chicago last month.

Meshel said the company has maintained tight fiscal controls: "We have no debt and we maintain close watch over inventory and receivables." Despite tight inventory controls, he claimed Adds has no trouble meeting delivery dates and is not experiencing any delay in obtaining components.

USSR Warns U.S. It Could Lose Soviet Market

MOSCOW — "Artificial limitations" on the sale of American computers to the USSR may result in the "total loss for U.S. firms of the Soviet market," according to Prof. Vladimir Myasnikov.

In a by-lined article carried by Novosti, the Soviet press agency, Myasnikov, who heads the USSR State Committee for Science and Technology, claimed that the refusal by the U.S. to export processors of a certain size and some peripheral devices would not harm the Soviet Union.

The damage would be minimal, he reasoned, because the Soviets can either produce the equipment they need or they can trade freely with U.S. competitors, most notably France and West Germany.

The Soviets published Myasnikov's remarks shortly after they canceled a contract for a Univac 1100 system that was to be used by Tass, the Soviet news agency, for text editing and reporting the results of the 1980 Olympics in Moscow [CW, April 16].

Miffed by the Carter Administration's long delay in approving an export license, the Soviets instead contracted for an Iris-80-based system to be supplied by CII-Honeywell-Bull and Thomson-CSF. Ironically, the U.S. approved the export license shortly after the Soviets defected to the French.

Although the final outcome of the Soviet-Univac-French affair has not been determined, sources close to Univac say the company is not optimistic.

Capitalizing on Sentiment

The release of Myasnikov's article appeared to be timed to capitalize on the sentiment surrounding Univac's loss of the contract. "In a word, delay in removing discriminatory measures on the part of the U.S.A.

(Continued on Page 70)

Strong Growth Of PCM Sales Expected in '79

WALTHAM, Mass. — The installed base of mainframes plug-compatible with IBM processors stood at 434 units worth $817 million at the end of 1978.

That base of plug-compatible mainframes (PCM) is expected to leap to 1,055 units by the end of 1979, according to the latest statistics from International Data Corp., a market research firm here.

The nine PCM vendors in the U.S., offering a variety of models and better price/performance than IBM, are luring more users away from IBM. At the end of last year, IDC noted, IBM equipment accounted for 66.6% of all general-purpose computer systems. The PCMs grabbed a 10% share of all shipments in this category, resulting in 76.2% of all shipments being IBM-type equipment.

In fact, IDC estimated that in 1977 Amdahl Corp. and Itel Corp. together shipped more systems of 370/158 size or larger than all other non-IBM mainframers combined.

Service firms were a particularly strong market for PCM vendors. With service firms supplying support to the end user, the PCMs could go the OEM route, concentrating on producing in volume without having to hold customers' hands, IDC said.

Amdahl Base Doubles

Amdahl doubled its installed base in 1978, increasing from 64 to 150 its number of installed units. The dollar value of Amdahl installations stood at $475.9 million at year-end, up from $266.1 million in 1977, IDC noted.

While Amdahl remains the major factor in the PCM marketplace, Itel is rapidly following, having increased fourfold its installed base. At the end of 1978, Itel's 228 installed units were worth $318.5 million.

Similarly, Control Data Corp. showed a sixfold increase in installed base during the year, with 50 installed units valued at $20.7

(Continued on Page 68)

PCC, Univac Sign Pact

LOS ANGELES — Pertec Computer Corp. (PCC) has signed a contract to provide Univac with an advanced distributed data entry system. The contract is expected to exceed $20 million.

Under the terms of the three-year agreement, PCC will manufacture the Univac 1900/10 Computer-Assisted Data Entry (Cade) system, which is compatible with Univac's currently offered Model 1900.

When used in a distributed processing configuration, the system will offer users local file management with remote access to files contained within the host computer, PCC said. The system will be expandable to achieve greater memory and processing power than the 1900. Delivery of the first production units is scheduled for the last quarter.

Newsletter Details Opportunities

WORCESTER, Mass. — A weekly newsletter describing worldwide trade opportunities for U.S. computer manufacturers is now available from Manufacturers Export Reference Co., Inc. (Merco) here.

"The International Weekly for the Computer Industry" includes information on foreign companies interested in buying U.S. computer-related equipment and software, potential overseas distributors and agents and overseas licensing.

"The DP market overseas is often difficult for small to medium-sized U.S. companies to establish a foothold in," Earl H. Bunker, president of Merco, noted. However, opportunities overseas are plentiful; it's simply a question of bringing the buyer and seller together, he said.

The newsletter also contains features on changing market conditions overseas and evaluations of DP markets in specific countries.

The newsletter sells for $350 per year or $90 per quarter. Further information can be obtained from Bunker at Merco, which is located at 340 Main St., Worcester, Mass. 01608.

Sale of PCMs To Double

(Continued from Page 67)

million.

Upstart Magnuson Systems Corp. installed six units valued at $2.4 million, IDC reported.

The foreign market for PCM equipment is currently growing more rapidly than the domestic market, IDC claimed. Itel and Amdahl were the only PCMs selling outside the U.S. last year. Itel grew from an installed base of five units to 77 units by the end of 1978 and Amdahl increased its installed base from 17 to 53 units during the year.

New Directions

With hardware prices in a downward spiral, the PCMs will have to move in new directions to assure continued profitability, IDC forecast. Selling software offers the most promise of increased revenue and operating margins.

As far as market opportunity is concerned, IDC said the huge backlog in orders for IBM Series 30 processors creates an opening for the PCM vendors. To date, most PCM vendors have been targeting IBM's 370 base.

Although IBM has definitely been losing accounts to the PCMs, IDC noted that from IBM's standpoint it is better to lose these orders to PCMs than to traditional mainframe competitors because the giant stands a better chance of reconverting the PCM base at a later date.

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Vendors See Technology Curbing Graphics Mart

NEW YORK — Vendors of computer graphics equipment discussed the advantages and pitfalls of state-of-the-art technology at a conference held here recently.

Despite all the hullabaloo over raster scan vs. digital TV displays, vendors pointed to problems in technology that could limit the market for graphics equipment.

Peter G. Cook, market information and research manager at Tektronix, Inc.'s Graphic Display Division, called attention to "jaggies" — line irregularities particular to raster scan devices. Eliminating these jaggies increases the cost of the terminal considerably.

Doubling resolution, for example, would require a fourfold increase in memory and, at the same time, decrease the response time by the same square power, one conference attendee noted.

In the area of plasma displays, Lester Turner, applications manager for Interstate Electronics Corp., described the technology problem as a "chicken and egg" dilemma.

Standard 8.5- by 8.5-inch panels cost $1,200 each in 1,000-unit quantities compared with the $30 unit cost of CRTs purchased in large quantities. To lower the price of plasma displays even a couple of hundred dollars requires an annual production volume of 100,000 units, Turner claimed. For most companies, that rate is unattainable, he added.

However, he forecast that a new generation of terminals carrying $5,000 price tags would be available by 1980, leading to a threefold increase in demand. Currently a typical terminal costs $10,000, he said.

While these technology glitches may dull the market somewhat, other vendors reported on opportunities for specific market sectors.

Reporting on a 10-page questionnaire California Computer Products, Inc. distributed to 2,000 users, Gene Brewer, the company's vice-president, said plotters remain a "virgin market," with only 12% of all potential sites explored.

Graphics Market Seen Ripening

(Continued from Page 67)

Johnson also pointed to the impact of low-cost minicomputers on the graphics marketplace. "Approximately 65% of all interactive computer graphics resides on Digital Equipment Corp. host machines," he observed.

Conference participants analyzed two disparate applications areas — computer graphics-aided design, engineering and manufacturing and so called "presentation" graphics such as histograms, pie charts and linear curves.

• Computer-aided design (CAD). Big market growth in this application area appears assured, according to all speakers commenting on the subject. Tektronix's Cook said "we are beginning to see CAD's integration into manufacturing" and predicted "substantial short-term growth will occur."

Dr. Fontaine Richardson, a vice-president at CAD/-computer-aided manufacturing (CAM) turnkey systems supplier Applicon, Inc., agreed with that observation, forecasting that the $160 million CAD/CAM market experienced in 1978 would nearly quadruple, reaching $600 million by 1984. The reason — increased user productivity, Richardson said, claiming a 3:1 productivity factor as the industry average, with the ratio soaring to 60:1 for special applications.

About 20 companies already produce turnkey CAD systems that sell at an average $250,000. "More than 3,000 systems have been installed," Machover reported. "Nearly 75% of all integrated circuit design activity, in fact, employs computer graphics capabilities."

• Presentation graphics. This application is essentially "the transfer of data into information," according to Andres Vinberg, director of development and market planning for Integrated Software Systems Co. More specifically, it is the conversion of data into pictorial form to show at a glance patterns embodied in the data.

Interactive graphics can lead to tremendous cost efficiencies, particularly when a trial-and-error approach is necessary for selecting the most effective graph presentation, Vinberg said.

IBM's John A. Dawson concurred. Dawson, as consulting instructor at IBM's customer executive program in Poughkeepsie, N.Y., heads a "business presentation room" that makes use of IBM's own Trend/Analysis 370 software. He reported that "executives generate something like 100 graphs on average to find the four or five best ones that they will want to use in a given presentation."

Machover conceded that the penetration of graphics-based management information systems into industry has been "extremely slow." He pointed to three recent developments, however, that hold out "real promise" of opening up the field:

• IBM's Trend/Analysis 370 management graphics software package that marks IBM's reentry into the field.

• Financial planning and analysis software packages introduced by Tektronix.

• Recently introduced computer-generated color charts and graphs offered by service bureaus and time-sharing vendors.

Nisen is editor of The Harvard University Newsletter on Computer Graphics *that will be published beginning in July.*

Supershorts

Autologic, Inc. has named CTT Gesellschaft fuer Computer and Textverarbeitungs-Technologie GMBH as distributors in Austria and the Eastern Bloc countries. Both firms will handle all Autologic products including CRT phototypesetters and scanning and microfilm systems.

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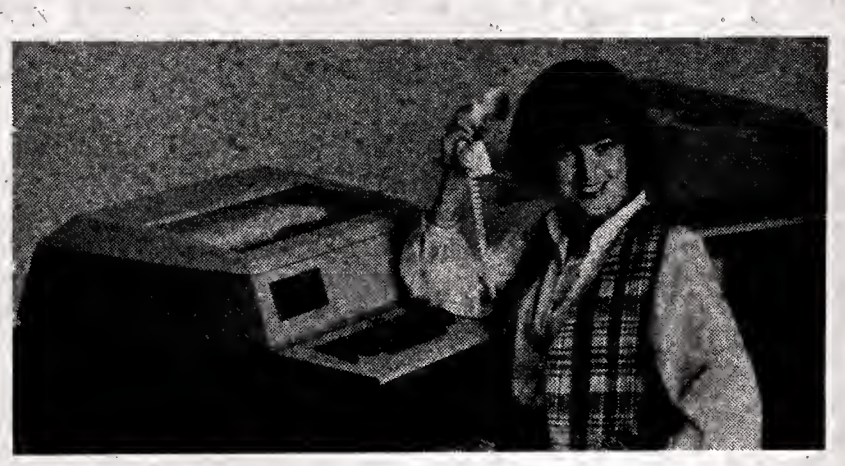

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Nickels & Dimes

Atlantic Research Corp. has filed a registration statement with the Securities and Exchange Commission for a proposed public offering of approximately 500,000 shares of its common stock at a price expected to range between $10 and $12 per share.

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Paradyne Corp. has signed an agreement with Decimus Corp. under which Decimus will purhcase $5 million of lease contracts during the first year of the agreement. The agreement contains an option to extend the program for a second year.

$ $ $

Centronics Data Computer Corp.'s board of directors has approved a quarterly cash dividend of 25 cents per share payable July 9 to holders of common stock June 15.

$ $ $

Control Data Corp. has declared a dividend of 10 cents per common share for its second quarter. The dividend is payable June 29 to shareholders of record June 1. The firm also declared a quarterly dividend of $1.125 per share of preferred stock.

USSR Says Americans Risking Soviet Market

(Continued from Page 67)

may lead to the USSR deciding to reorient itself wholly to other trading partners," Myasnikov warned.

"These barriers have been erected under the pretext that cooperation in this sphere (trading) is beneficial only to the Soviet Union. The impression is gathered that the quarters hindering the cooperation . . . pretend not to know Soviet achievements in computing techniques," he continued.

Softening these remarks somewhat, Myasnikov commended the sale to the Soviets of several Control Data Corp. Cyber 172 processors.

Developing Technology

While desirous of trading with the West, the Soviets are avidly developing their own technology. Myasnikov said that within the country there are 40,000 researchers and designers and 300,000 skilled laborers working in the computer industry.

A system now being developed by the Soviets, the ES 1065, will be capable of four million to five million instructions per second (Mips) and have an "internal storage capacity" of 16 M bytes.

The ES-1060, produced since 1977, has a capacity of 1.3 Mips and storage on removable disks of 100M bytes. The Soviets rated the software of the ES 1060 at the level of the IBM 370/158.

Moreover, Myasnikov claimed that the Soviets have started production of microprocessors and are working on large-scale integrated circuits.

The basic unified computer system integrates 75 logical elements per body, with a delay time of 1.5 to 2 nsec. Memory elements have a capacity of 4,000 bits per chip and an access time of 15 to 45 nsec, Myasnikov said.

Info Gains Permanent Home

NEW YORK — Starting this year, the Information Management Exposition & Conference (Info) will be held in New York only instead of alternating annually between New York and Chicago.

To take up the slack in the Windy City, Clapp & Poliak, Inc., the firm that started Info in 1974, will produce Info Manufacturing in Chicago yearly beginning Nov. 18, 1980.

Info Manufacturing will concentrate on manufacturing information system applications, whereas Info is aimed at all types of business and government organizations.

Info '79 will be held at the Coliseum Oct. 15-18.

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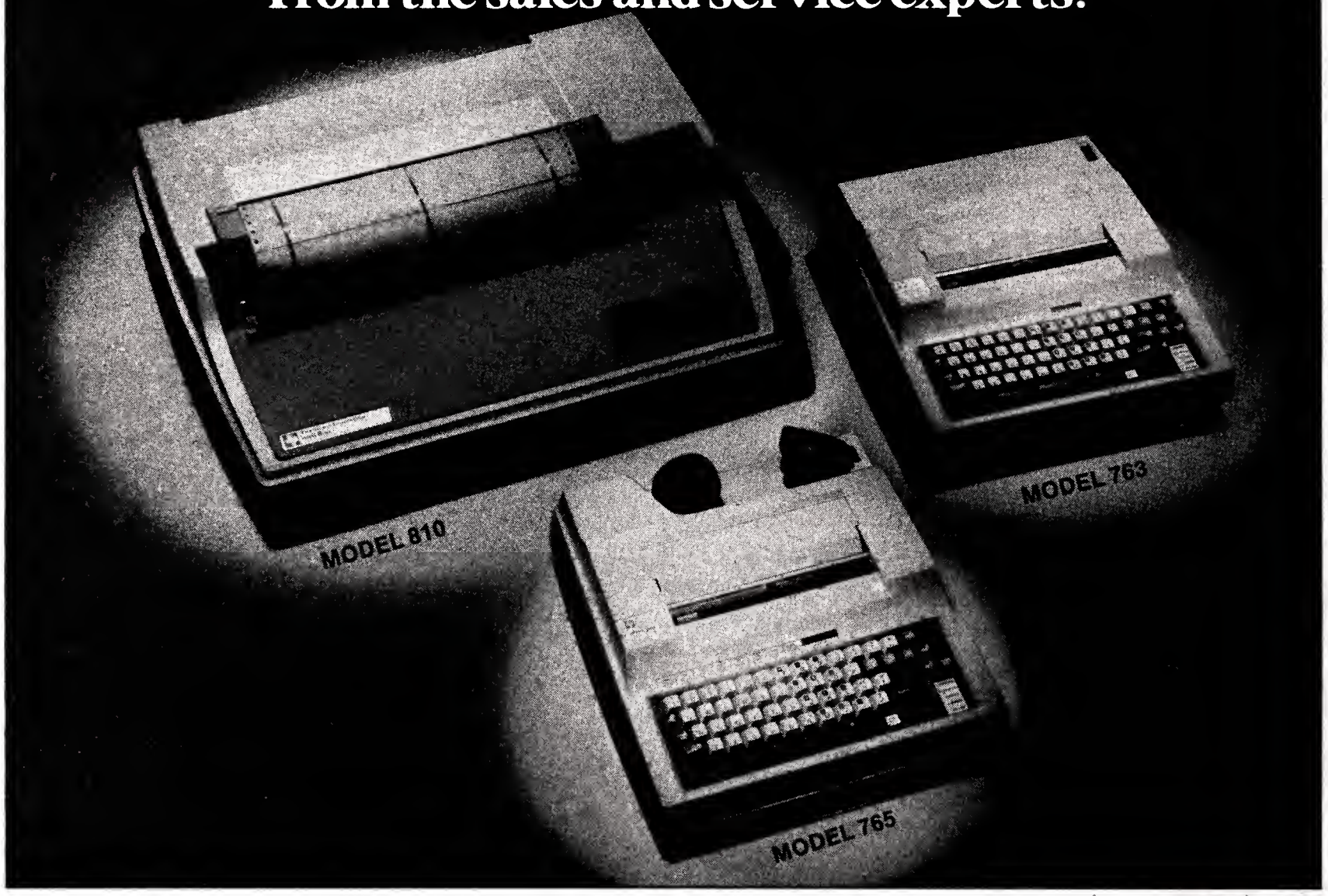

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Calcomp Agrees in Principle to Sanders Merger

By Marcy Rosenberg
CW Staff

ANAHEIM, Calif. — California Computer Products, Inc. has agreed in principle to a merger proposal by Sanders Associates, Inc. valued at about $45.9 million.

Calcomp's board approved a tender offer by a Sanders subsidiary of $13.50 a share for up to 1.26 million Calcomp shares — 37% of the firm's 3.43 million outstanding shares.

Both companies also agreed in principle to a later merger in which the remaining Calcomp shares would be exchanged for cash and for Sanders common stock valued at $13.50 a share, pending an appropriate due diligence study of Calcomp's financial report at the close of its fiscal year June 30.

The $13.50 price could be modified in accordance with Sanders' stock price at the time of the merger, according to Jack Bowers, Sanders president and chief executive.

Divesting Memory Operation

Details of the proposed acquisition came shortly after Calcomp revealed plans to sell its plug-compatible memory products operation for $13.5 million in cash and securities to Braegen Corp., a manufacturer of intelligent data terminals.

"Debt reduction" spurred the decision to divest the plug-compatible memory operation, George M. Canova, Calcomp president and chairman, said. The move followed the firm's recent sale of its OEM memory operations in separate transactions to Xerox Corp., Billings Computer Corp. and Advance Machine Corp.

Prior to Xerox's $25 million purchase of the bulk of Calcomp's Memory Products Division [CW, March 26], Calcomp owed more than $42 million. Billings acquired the division's small disk operation for about $1.8 million [CW, Jan. 15], and Advance Machine paid about $1 million for its metal cabinet manufacturing operation.

As part of the proposed merger, Sanders will provide Calcomp with additional cash by purchasing a 10% subordinated note for $7.65 million from the firm.

For fiscal 1978, Calcomp earned $1.5 million or 45 cents a share on sales of $120 million. Earnings included an extraordinary credit of $539,000 or 16 cents a share.

Sanders reported earnings of $19.3 million or $3.75 a share, including an extraordinary gain of $8.9 million or $1.73 a share for its last fiscal year ended July 28. Revenues totaled $150.5 million.

Calcomp's management and board are recommending that shareholders approve the tender offer. If the merger deal goes through, Sanders will round out its OEM interactive graphics and defense electronics equipment business with what Bowers called Calcomp's "outstanding position in digital plotters and early developing end-user graphics systems business."

Seeking Broader Market

Sanders will continue to target its equipment to such applications as computer-aided design (CAD) and computer-aided manufacturing (CAM), air traffic control and military training and simulation. Through Calcomp, "we will acquire an international and domestic end-user sales, service and distribution organization" with which to seek "a broad user market," Bowers noted.

Under the merger proposal, Sanders expects to continue to operate Calcomp from its headquarters here.

In January 1977, Sanders sold its Data Systems Division to Harris Corp. for about $21 million. This move took the firm out of the highly competitive end-user market for plug-compatible interactive computer equipment.

"We retained at that time the high technology level of equipment that provided interactive graphics capability needed for CAD/CAM," Bowers noted, adding his firm was not interested in Calcomp's plug-compatible memory operation.

Calcomp began manufacturing IBM plug-compatible tape and disk memories in the early 1970s, but found it could not compete with IBM's pricing structures and stopped producing these products.

Even so, the company said last year it would continue to purchase plug-compatible memory products from other vendors to sell to its existing customer base and to new prospects.

Calcomp has now apparently shelved these plans as well. Under its proposed deal with Braegen, Calcomp will divest inventories, receivables, spare parts and distribution and service operations for plug-compatible products including disk and tape drives, add-on memory and its automated tape library.

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2. Our Show Issue
This is the issue we publish as the show opens. It'll have last-minute show information, speech previews and other show details. If you're there, pick up a copy at the **Computerworld** booth. Issue date is June 4th. Color ads must be in by May 18th, black and white by May 25th.

3. Our NCC Wrap-Up Issue
Before the hall gets cold, our staff of 20 editorial people will have prepared their reports and filed them in time to appear in this informative wrap-up issue. You'll read who said what, who introduced what and how it works, and review the show's features and highlights in words and pictures. Issue date is June 11th. Color ad close is May 25th, and black and white ads close June 1st.

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Trade Groups Fear FCC Control of DP Industry

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Data processing industry representatives told Congress recently that proposed revisions to the Communications Act of 1934 could inadvertently lead to government regulation of the computer industry.

Spokesmen for three DP trade groups urged the Senate Communications Subcommittee to prevent that possibility by tightening the language of the legislation being considered. They also expressed concern about the manner in which AT&T might be allowed to enter the DP marketplace under current proposals.

Bills introduced by Subcommittee Chairman Sen. Ernest F. Hollings (D-S.C.) and Sen. Barry Goldwater (R-Ariz.) would abrogate the 1956 Consent Decree in which AT&T agreed not to offer DP products and services. Simlar legislation is being considered in the House of Representatives.

"The sweeping language" of the Hollings bill (S. 611) "would give the Federal Communications Commission [FCC] jurisdiction over all commerce in telecommunications and electronic equipment and services and in information software and services," according to Stephen G. Jerritts, representing the Computer and Business Equipment Manufacturers Association (Cbema).

In testimony before the Senate panel earlier this month, Jerritts, a vice-president of Honeywell, Inc., said "this proposal to extend the jurisdiction of the FCC is inconsistent with the declared purpose and intent of S. 611 and is clearly inconsistent with the prevailing trend toward deregulation."

Acknowledging that Congress never intended the DP industry to come under FCC regulation as a result of this legislation, Jerritts said that "a future, regulation-minded FCC could subject the information industry to major common carrier regulation under the jurisdictional mandate of S. 611" As an example of the problem, he noted that one section of the bill "permits the FCC to establish and enforce such requirements with respect to design, manufacture and maintenance standards 'as are necessary . . . to foster competition in the relevant telecommunications equipment, electronics equipment, information software and information services market or markets.'

"Read literally," he said, "this section gives the FCC the power to order changes in the design of computers, to prevent the introduction of new computer models or to require specific interfaces for data processing equipment if these actions would foster plausible competition in the information software or service market."

'Major Inconsistency'

L.C. Whitney, president of National Data Corp., in lengthy testimony presented on behalf of the Computer & Communications Industry Association (CCIA), told the subcommittee that "at present the bill would appear to have a major inconsistency in recognizing that the problem of cross-subsidy and denial of access, as they relate to communications services, requires a 'full separation' solution, while at the same time there is the implication that separation between dominant or monopoly communication services and other competitive offerings is not required.

"It is CCIA's position," he said, "that divestiture of competitive components is the only solution that eliminates the incentive for a monopoly carrier to cross-subsidize or deny access."

"Even with Consent Decrees in effect, there has been an established history of anticompetitive practices by AT&T in communications markets," he argued. "How then does this subcommittee conclude that lifting the decree — when it would permit the extension of such anticompetitive practices into noncommunications markets such as data processing — is a pro-competitive action?"

Rejecting AT&T's proposal, put forward earlier in the hearings, that cross-subsidy can be avoided through a fully distributed cost accounting system, Whitney said that "a separate subsidiary or maximum separation approach, i.e., coroporate separation," would permit "monitoring of the relationship between monopoly and competitive services on a broader level, allowing the commission and competitors to scrutinize transactions between the monopoly and competitive companies."

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AT&T Making Stand Against Subsidiaries

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — In the continuing hearings on congressional proposals to rewrite the Communications Act of 1934, AT&T has strenuously argued against any breakup of the Bell System.

While praising the concept in the proposed legislation of relying on competition instead of regulation to shape the telecommunications marketplace, AT&T representatives have told both the Senate and House Communications Subcommittees that accounting systems can be adequate subsidiaries to prevent cross-subsidization.

The argument has been part and parcel of the testimony of almost every AT&T official to appear before the two subcommittees. The strategy was laid out in detail May 2 by Edward Goldstein, assistant financial officer in AT&T's Executive Department.

Goldstein, whose duties include repsonsibility for revising AT&T's uniform system of accounts, told the Senate panel that "AT&T does not object to the setting up of subsidiaries and we could not manage the business without them. Creating another subsidiary, or even several additional subsidiaries, would not destroy the Bell System."

But, he said, the company wants to make sure that "our subsidiaries make business sense and make management sense. This means several things: there should be no unnecessary subsidiaries; each subsidiary should be economically viable; and it must be possible for the subsidiaries to work with their parent and other affiliates on a reasonable basis."

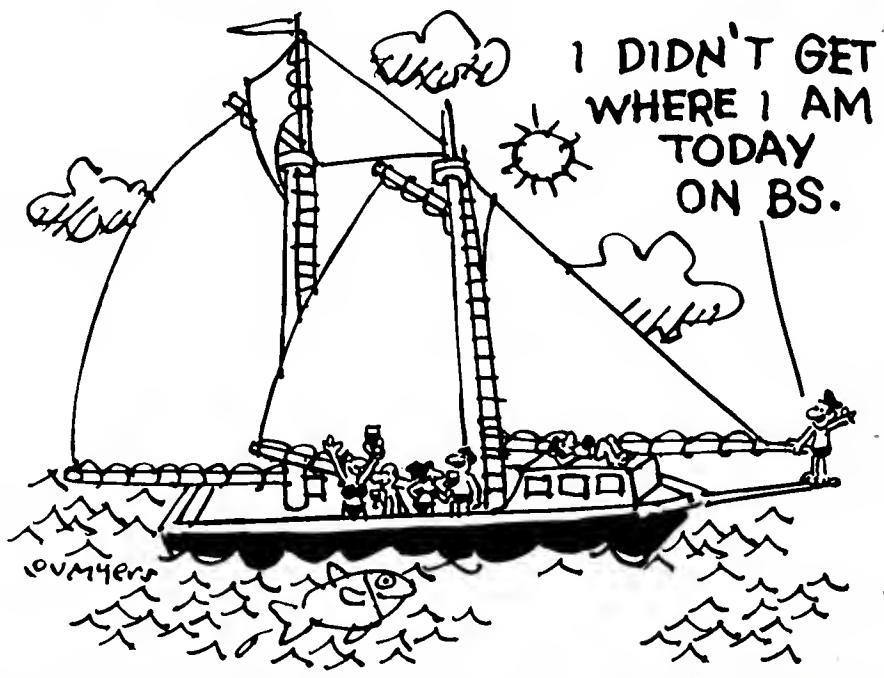
The problem is to arrive at an accounting system that satifies regulators and competitors that AT&T is not practicing cross-subsidization, Goldstein emphasized. AT&T's present accounting system "does everything that is expected of a good financial accounting system. What we do not have is a good cost accounting system . . . that will allow us to determine accurately and routinely, on an outgoing basis, the costs of the individual services we provide our customers."

Cost System Half Done

Goldstein agreed with a suggestion by Subcommittee Chairman Sen. Ernest F. Hollings (D-S.C) that the major reason AT&T does not have an adequate cost accounting system now is that the firm has never been required to have one. However, Goldstein said, "in 1973 the Bell System undertook to develop such a system." After the expenditure of approximately $400 million, the new system, called Functional Accounting, is about half finished, he added.

"This system, based on the most modern data processing capabilities, would give us, routinely and on an ongoing basis, the cost and revenue data our managers would need to run the business and also to satisfy the regulatory needs of this new multi-service, competitive environment" being fostered by the Federal Communications Commission and Congress.

Goldstein estimated the company will have a cost accounting system in place in about one year that will adequately keep track of AT&T's transactions in the terminal equipment marketplace. If that market is deregulated, as proposed in the legislation under consideration, AT&T will be able to prove through the accounting system that it is not cross-subsidizing those transactions, he claimed.



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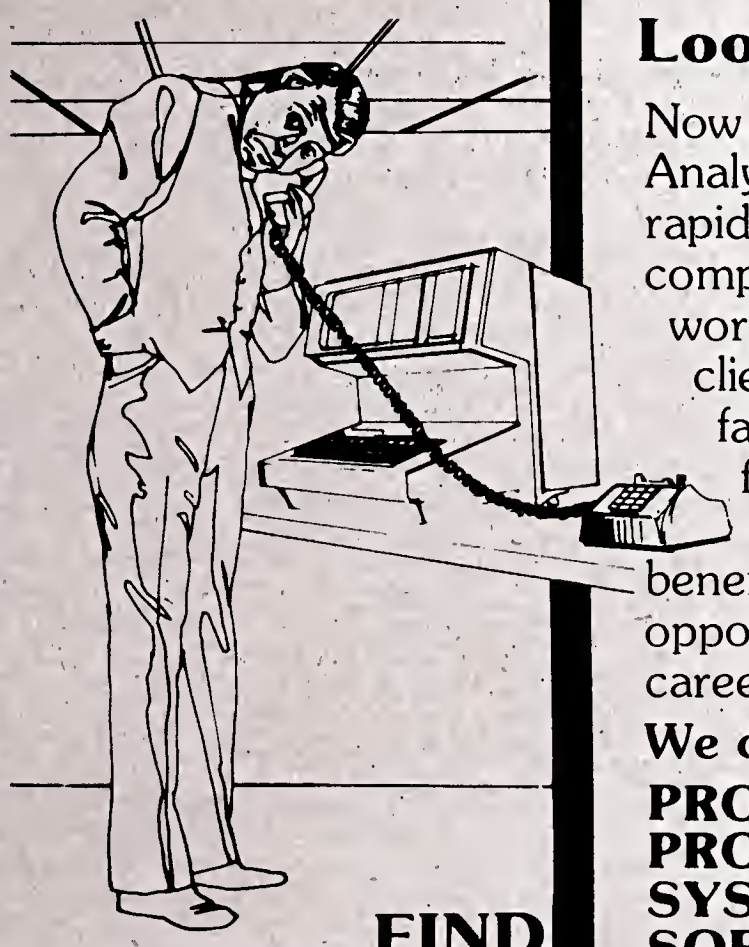

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GENERAL:

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The Division of Computing Research (DCR) is responsible for the research, development, maintenance and operation of systems and equipment used by the national computing facility, named CSIRONET. The facility serves CSIRO, Government Departments and instrumentalities, and other approved users. CSIRO, through DCR, is also called on to advise Government and others on computing policy and requirements. It has an annual revenue in excess of $6 million, and employs about 140 staff. The functions of DCR have recently been reviewed, leading to the restructuring of the Division into four Branches to meet the computing needs of its users as these requirements increase in quantity and complexity and change in direction. Each Branch comprises a number of research and development Sections and/or support Sections.

Each research and development Section comprises a research leader, at least one other research scientists, together with an appropriate support staff. The Sections solely engaged in support or co-ordination are not led by research staff. With few exceptions it is expected that the members of a Section will be located together. Each present or proposed Section is placed in a capital or large provincial city which includes at least one university and other tertiary educational or scientific institution.

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DUTIES:

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Under the Chief of the Division, the General Managers are the most senior officers of DCR, and are responsible for policy development, and for the management of the research and development activity of a Branch of the Division.

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1. **Computing Systems Branch.** Activities include research and development and the maintenance of the Cyber 76 Scope system, the NOS operating system, and VM system, and OSIV F4 system, mass storage systems, and distributed processing systems.

2. **Information Systems Branch.** Activities include research and development in distributed data base systems, information retrieval, computer security, simulation and system analysis, computational methods, classification methods, program structures and mathematical programming.

3. **Peripheral Systems Branch.** Activities include research and development of VLSI architecture and other hardware projects, picture processing, graphics, micrographics, the research, development and maintenance of packet switching and resource sharing networks, and of network performance measuring tools.

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Systems Group

Engineering Supervisor/ Systems Engineers

Here's your chance to combine your experience in the implementation of hardware or software with your knowledge of the application of computers to scientific problems. Multiple openings exist for a supervisor of a newly-formed systems engineering group, and for individual systems engineers with heavy emphasis on data acquisiton hardware, real-time software, scientific applications packages, signal/array processing, distributed lab systems, and scientific data management systems. The systems group participates in a team with software, hardware and marketing professionals.

You will influence product designs by considering application requirements and human factors issues, and then participate in implementation activities. Additionally, you will play a key role in creating long-range product strategies for LDP. A background in scentific computer applications and a Bachelor's degree, or equivalent, in a technical field are essential for the supervisory position. In addition, a minimum of 7 years experience in software and hardware development, with at least 2 years as a project leader, is required. Systems engineers will need 5 or more years of experience developing hardware or software for scientific applications.

Systems Program Managers

Openings exist for program managers to plan and manage to goals large inter-disciplinary projects. To succeed here, you should have good business sense, a Bachelor's degree or equivalent, and a minimum of 5 years experience in computer hardware or software engineering.

Hardware

Opportunities exist for hardware designers to play a key role in the specification, design and implementation of high-speed digital real-time I/O minicomputer interfaces.

Operations Group

There are several positions offered in the supervisory quality assurance, and produce support areas. Some openings emphasize involvement of quality assurance of software products through the development phase of a project. Others emphasize involvement in areas of maintenance and new product releases to production, plus ongoing engineering support of existing products. Supervising positions for the above efforts are also open both in hardware as well as in software activities. As a team with the existing personnel, they will set and perform activities to goals such as reliability of product, and system performance for customer product acceptance.

Exposure to assembly language and real-time operating systems is key. Openings exist for people with a wide range of experience.

These positions are located at Digital's Marlboro, Massachusetts facility. Here, just 45 minutes west of Boston, you'll enjoy some of the best of rural New England living, yet still be close enough to enjoy the cultural and entertainment resources of the city. You'll also be close to fantastic skiing on the slopes of New Hampshire and Vermont, the summer seaside retreats of Cape Cod, and excellent schools and shopping centers.

If you are unable to call, please forward your resume, including salary history, and indicating position or positions of interest to Ken Wilson, Digital Equipment Corporation, Dept. G521 3807, One Iron Way, Marlboro, Massachusetts 01752. We are an equal opportunity employer m/f.

digital

Development Manager

Reuters, the international news organization requires a Software Development Manager. The successful candidate should be capable of coordinating the activities of the project managers to provide cohesive overall systems development. He or She will be responsible for allocations of systems resources, manpower assignments and give assistance to the Company's operations and maintenance departments.

He/she should have at least five years experience managing a software development group together with extensive experience as a programmer/analyst in real-time environments as well as excellent knowledge of comptuer peripherals, communications and database/-file structures. Overall knowledge of the PDP-11 family, assembly language and RSX-11M is essential. The Development Manager must also have excellent communication skills both oral and written as well as an advanced professional degree.

This post offers a first class opportunity for someone to progress in a dynamic and innovative organization.

Salary $35,000 + Excellent benefits.

Applications in writing only to:

REUTERS

Staff Department

REUTERS LTD

1700 Broadway
New York, NY 10019

An equal opportunity employer M/F

LEAD CAD PROGRAMMER

Position available for an innovative, problem solver with the Electronics Division of Xerox where your assignments involve the development of advanced digital electronics subsystems for a range of products.

Requires BS/MS CS/EE (or equivalent) with 3 or more years experience in PWBA CAB programming. Successful candidate will plan, design, and develop software systems to aid the entire engineering process and:

- function as Project Leader
- design and develop PWBA design aids
- develop placement and routing algorithms
- continually develop and maintain a state-of-the-art CAD system

Positions also available in:

- Programming for Automated PCB Design
- Programming for Automated LSI Circuit Layout

We offer excellent starting salaries and comprehensive benefits including profit sharing. We are an affirmative action employer (male/female).

If interested, please send a copy of your resume to Mr. Thomas Householder, Dept. CW-521, Xerox Corporation, 701 South Aviation Blvd., El Segundo, California 90245.

XEROX

Compugraphic... Positions in EDP

Compugraphic offers a truly unique alternative for successful professionals who want to utilize their talents in new and different ways ... impact the decision-making process ... and receive the reward and recognition to which they are entitled.

We are just the right size — small, but not too small. Growing, but not overgrown. With $181 million in sales in 1978 and over 4,300 employees, we will recognize — and reward — your efforts. We need highly qualified professionals who can take our sucessful computerized systems and enhance them to better serve the challenges of a rapidly growing company.

Division Systems Development Manager

The ideal candidate will have 6-8 years in design and programming of business systems. You will plan, organize and control the activities of the Systems and Programming group assigned to supporting the Marketing, Corporate Planning, and International Divisions at Compugraphic.

The individual should enjoy a challenging yet informal work climate. A Bachelor's degree is mandatory, while a graduate education is desirable. Experience on Honeywell equipment and/or on-line order entry systems would be a plus, but is not required.

Data Base Technology Manager

This individual will direct activities related to the administration of computerized data bases, which include their definition, organization, protection, efficiency, documentation and operational requirements.

Candidate should have 4-6 years data processing experience with emphasis in the operations and data base systems area. Experience on Honeywell Level 66 hardware and GCOS, IDS, TPE are a requirement. Individual selected will play a key role in upgrading our information processing facility to operating in a full service environment.

Systems Programmers

We are in need of systems programmers for a large Honeywell system. We currently have a Honeywell 66/60 installed; it will be upgraded to a Honeywell DPS-3 in June.

Applicant must know GCOS, GRTS, TPE or IDS-1. We are headed towards GRTS-11 or NPS in conjunction with upgrading our communications system from DATANET 355 to a INP6651.

Senior Programmers/Programmers Business Applications

Here's your chance to join Compugraphic and share in the rewards of our growing company. Right now, we're looking for well-organized, self-starting individuals, with the ability to work well in a growing environment, to assume responsibility for developing, testing, installing and documenting programs and systems.

Previous experience within an applications environment using FORTRAN and COBOL is desired. Senior programmers should have 2-4 years of programming experience. A knowledge of Honeywell 6000/66 would be a plus. Salary is commensurate with experience. A Bachelor's degree or equivalent experience is required.

If you are interested in any of the above positions, please send your resume, including salary history, to Robert King.

Compugraphic offers excellent starting salaries, pension plan, a full range of company benefits, promotions from within, excellent profit sharing and is conveniently located at the junction of Routes 93 and 129 in Wilmington.

cg compugraphic

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Wilmington, MA 01887
(617) 944-6555

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PROGRESSIVE MANAGEMENT

Suite 202, Two Executive Campus
Cherry Hill, NJ 08002

1. Leeds & Northrup is in the technological forefront in the design and development of state-of-the-art computerized process control systems for electric utilities and heavy industry.
2. We are quick to apply the latest advances in technology to our systems and programs of our own design and engineering.
3. You'll be a part of a project team, where you will learn a great deal from senior members and interface with other groups in engineering, hardware, software, and applications.
4. Your individual contributions to the team effort will be recognized and you will have high visibility to management.
5. Long term projects (average length, 18-24 months), with many other major projects to follow, assure you of a continuous flow of challenging and rewarding assignments and exceptional job stability.
6. Leeds & Northrup's growth is averaging 20% a year. We have 32,000 active customers, including 444 of the top 500 industrial companies in the country—plus many large utility/power companies.
7. Growth of the industry. With industrial technology advancing at enormous speeds, pressure to improve productivity and quality control taking on ever-increasing importance, and the need to conserve energy and protect the environment, more and more companies are turning to process control systems ... and to the industry Leader—Leeds & Northrup.
8. Leeds & Northrup is committed to the design and development of the most advanced, state-of-the-art process control systems that experience, ingenuity, and dedication can build. And we're as interested in your growth as much as we are in our growth, because you and we are one.
9. Leeds & Northrup is known throughout the industry for its professionalism, the quality and reliability of its products and systems, and the excellence of its professional staff.
10. Leeds & Northrup has a Short Cycle Evaluation Program (SCE) that assures you of performance and salary reviews throughout the year — and the visibility that goes with it.
11. Leeds & Northrup's Systems Group and Applications Training Programs allow you to set the pace of your training in line with your background and abilities. What's more, we promote on demonstrated ability — not longevity or seniority. This means that you can "leap-frog" those who, although they have more time with the company, do not have your abilities.

On top of all this, Leeds & Northrup offers competitive salaries, a comprehensive benefits program, and an highly desirable suburban location offering excellent housing, public schools, and many Universities nearby; proximity to numerous recreational areas, cultural centers, and universities.

A Career with Leeds & Northrup ... the reasons are as numerous as the opportunities.

FOR FULL DETAILS, CALL JIM HENDERSON, OUR MANAGER OF PROFESSIONAL EMPLOYMENT, ANYTIME, DAY OR NIGHT, WEEKDAY OR WEEKEND, JUST CALL: (215) 643-2000, EXT 2010. OR, IF YOU PREFER, SEND YOUR RESUME TO: JIM HENDERSON, SYSTEMS GROUP, DEPT. C-S/21, LEEDS & NORTHRUP, DICKERSON ROAD, NORTH WALES, PA 19454.

SCIENTIFIC PROGRAMMERS SOFTWARE MANAGERS

Typical assignments will involve:

SYSTEMS SOFTWARE
Design and integration of operation systems and software development

MAN/MACHINE INTERFACE
CRT graphics, loggers, operator's panels

APPLICATIONS
Electric power applications, both systems control and plant performance monitoring; Waste Water, CPI and other industrial applications

COMMUNICATION
Data acquisition, control output, computer-computer communications

SUPPORT PROGRAMS
Data base generators, display compilers, source editors, general utilities

Preferred backgrounds will include a B.S. degree in Engineering, Mathematics, Physics, or Computer Science and hands-on related experience, with at least one year of FORTRAN in a scientific programming environment. Electric power experience in real-time control systems, Waste Water, CPI or other industrial applications is an asset, as is a knowledge of ASSEMBLY.

SOFTWARE DEVELOPMENT MANAGER

This line management position is responsible for 1S-20 programmers; developing real time minicomputer operating systems and related software and application programs and operating systems for microprocessor based I/O and MMI devices. You will participate in overall new product definition and planning and should have project and line management experience in a programming environment.

SYSTEM TEST ENGINEERS

Step up to large scale systems. They consist of in-house and OEM computers with I/O peripherals, video and communications equipment. Your job is to integrate the equipment and make it run. NO TRAVEL.

PRODUCT SUPPORT ENGINEER

Growth has created an opening for an electrical engineer with 4 years experience and exposure to computers, peripherals and video display subsytems. Familiarity with microprocessors and marketing desirable. This position provides technical support to marketing and engineering in areas of planning, promotion, applications, and manufacturing.

FIELD SERVICE ENGINEERS

Your major function will be the start-up and support of large scale digital control and data acquisition systems and may involve international travel. Experience with Xerox S50 or similar systems is particularly desirable.

SCIENTIFIC PROGRAMMERS · SOFTWARE MANAGERS

11 realistic reasons why you should join

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Dept. C-S/21

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SENIOR CONSULTANT IMS

Informatics, a world wide leader in software products and Professional Services is looking for a Senior Consultant with a strong background in IMS systems. In addition, the ideal candidate should have excellent communicative skills, ability to teach and design IMS systems, interface directly with Senior Management, possess project manager capabilities, perform feasibility studies, be able to effectively allocate technical resources, and have a solid business background. This position requires approximately 50% travel, and base location could be either San Francisco, Los Angeles or Dallas. In addition to the excellent salary compensation and comprehensive benefits package we offer an opportunity to join an organization of over 2200 dedicated professionals with revenues in excess of 90 million. If you are interested in this highly visible position, please send resume in confidence to:

Joseph A. Tirado
c/o Informatics/PSG
1121 San Antonio Road
Palo Alto, California 94303

informatics inc

SOFTWARE REPORTER

The leading weekly newspaper in the electronics/computer field is seeking to develop a reporter to cover fast-breaking events in the computer software industry out of our NY office. The ideal candidate will have an academic background in programming with some professional experience and will have a good grasp of English grammar to write clearly on industry developments. We will train in the basics of newspaper writing. If you are interested in expanding your career into the exciting field of business journalism, send resume with salary requirements to:

CW Box 1933
797 Washington St.
Newton, MA 02160

MVS Systems Programmer

Qualifications: Bachelor's degree or higher in Computer Science or related field with at least three years of experience in Data Processing, Data Design, and Systems Programming. Preference given to applicants having experience with MVS, IMS, JES2, and teleprocessing. Support computer is IBM 3033. Send confidential resume to: Dr. John M. Tyler, System Network Computer Center. Louisiana State University, Baton Rouge, Louisiana 70803. An Equal Opportunity Employer.

CSC

COMPUTER-BASED SYSTEMS

Department Manager for new Software Engineering Department

As a consequence of continuously expanding computer/communications systems programs at the Systems Division of CSC, a Software Engineering Department has just been established.

The department is the focal point for development and dissemination of software development methodology, new approaches, tools and procedures for state of the art development of communications software. Your "customers" will be other operations within this CSC Division, as well as outside, e.g., a current contract with the Air Force to develop a software development environment.

Another important activity will be collecting data pertaining to the cost of developing software, creating a data base containing that information, and using it as a basis for estimating the cost of future software contracts involving fixed price, turnkey systems.

This is an immediate opening with far-reaching growth potential for a candidate with a technical understanding of the subject, and the ability to lead technical people in the right directions. The post calls for at least 2 years direct experience in software development methodologies and tools, 5 years software development for communications, one year of management experience in software development.

Please forward your resume in strict confidence to the Director of Professional Staffing, MC-128 (AC).

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COMPUTER SCIENCES CORPORATION
SYSTEMS DIVISION
6565 Arlington Boulevard
Falls Church, VA 22046

PROGRAMMER ANALYST

Jim Walter Corporation has a position available at its headquarters in Tampa.

Requires 2 to 5 years experience including systems design, analysis and programming. Background should include CICS and proficiency in COBOL in an OS/VS or OS/IMS environment.

Excellent working conditions, merit salary program, plus complete benefit package. Reply in confidence by letter/resume including salary history to Employment Supervisor.

JIM WALTER CORPORATION
P.O. Box 22601
Tampa, Florida 33622

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Jim Walter corporation

University Of Petroleum And Minerals Dhahran, Saudi Arabia

The University of Petroleum and Minerals, Dhahran, Saudi Arabia, a technical university on the East Coast of Saudi Arabia, operating IBM 370/158 MVS TSO/SPF with 3 RJE and 70 interactive terminals, requires qualified staff to fill the following positions open for its Data Processing Center:

1. **SENIOR ANALYSTS**
   Positions are available in both the Administrative Data Processing area and Academic Computer Services. Require minimum BS degree and five years experience at least three of which in IBM/OS environment. Quality assurance experience preferable.
2. **SYSTEMS PROGRAMMERS**
   Degree plus three - five years of experience in IBM/OS systems programming with a minimum of two years in MVS environment.
3. **TRAINING SPECIALIST**
   To be responsible for staff development planning and conduct of DP training program. Require university degree plus Data Processing Training experience.
4. **EDUCATION SPECIALIST**
   Planning development and instruction of Data Processing courses. Require university degree and Data Processing experience, preferably in training
5. **DATA BASE ADMINISTRATOR**
   To assist in initial experience with use of DBMS and its administration. Require degree and minimum five years Data Processing experience IBM/OS environment, two in Data Base administration.

The University offers minimum regular contract for two years, renewable. Competitive salaries and allowances, free air conditioned and furnished housing, if available, otherwise housing allowance in cash for outside living, and repatriation to and from Dhahran each two-year tour. Attractive educationsl assistance grants for school-age dependent children of key staff provided. Local transportation allowance in cash each month. All earned income without Saudi taxes. Ten and half months duty each year with 45 days paid vacation in addition to official holidays during the year.
Interested candidates should send their applications together with photograph and curriculum vitae including the list of references and personal data such as home and office addresses and telephone contact, family status and copies of degrees/testimonials to:

University of Petroleum and Minerals
2223 West Loop South, Suite 410
Houston, Texas 77027
Telephone: (713) 871-9782

SDM/70 manager

FMC Corporation, a highly diversified international FORTUNE 100 Company, has a challenging opportunity for a qualified candidate in its Chicago based, Corporate Management Information Services Division.

The qualified candidate will have total responsibility for the implementation of SDM/70 and PC/70 at Corporate MIS and will assist with its implementation at our 45 national and international divisions. Responsibilities will include: identifying and coordinating policy decisions needed to ensure the effective use of SDM/70 and PC/70, developing management and technical training programs for MIS and user personnel, and establishing effective project control procedures throughout FMC. Five years of MIS project management experience is required. An MBA or equivalent is desirable.

If you are a professional willing to assume these responsibilities and challenges, we are prepared to offer an exceptional compensation and benefits package, as well as outstanding career potential. For immediate consideration, submit resume and salary history to: Joe Fullerman, MIS Recruiter., FMC Corporation, 200 East Randolph Drive, Chicago, Illinois 60601, or call collect, (312) 861-5908.
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FMC

COMPUTER SYSTEMS DEVELOPERS/APPLICATIONS PROGRAMMERS

Move up fast in one of EDP's fastest moving fields

at the Data Acquisition & Control Leader, NCR Engineering/Manufacturing, Sunnyvale, CA. (formerly Data Pathing, Inc.)

The rapid growth of industrial automation is what's making the data acquisition and control field one of the best places to be for EDP professionals. And the leader in that field, NCR/Sunnyvale, Ca., can be your entry point into this fast track.

You'll be working on projects resulting in complete turnkey systems, so you'll never wind up stuck in a narrow, limiting specialty. And the systems you'll help develop will be custom designed for some of the world's biggest and most prestigious companies, since our customers include over half of the Fortune 500.

Our current openings include:

Systems Developers

Initial assignments will be in data base design, operating systems design, compiler development, terminal development, diagnostics programming and systems architecture. You'll participate in the definition and implementation of new operating systems. Requirements include BS in Computer Science or equivalent and a minimum of four years experience in the design and implementation of operating systems, with emphasis on all phases of I/O Processors. Mini/micro systems experience is particularly desirable.

Applications Programmers

Work from customer specifications to code and test sophisticated real-time, on-line, data-collection and inquiry programs using a high-level language, a variety of I/O terminals and an advanced data management system. You should have 1-3 years programming experience using COBOL or similar language in a disc environment. CRT program coding experience is a big plus.

Our modern facility is located in Sunnyvale near San Francisco, where the off-job living offers all the comforts and attractions of a California lifestyle. You'll work in small groups, with high-visibility and broad responsibility.

* * *

We offer competitive salary, comprehensive benefits, and generous relocation/house hunting allowance, to make your move as easy as possible. For immediate consideration send your resume and salary history in complete confidence to: Mr. Hal Burton, Professional Staffing, Engineering & Manufacturing, NCR Corporation, Dept. E50 , 370 San Aleso Ave., Sunnyvale, CA. 94086.

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- **Branch Managers**
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For an interview appointment during the conference, send your resume and salary requirements to: **385 Ravendale Drive, Mountain View, California 94043, Attention: Carol Jo Wallace**, or call (415) 965-9900, ext. 212.

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For fifteen years, E.P. Reardon Associates has been placing professionals in better, more rewarding positions in New England and around the U.S. Our staff of Counsellors are well versed both in personnel and in the technical or administrative fields they cover. You can rely on us to handle your resume with discretion and in a professional and confidential manner. We're proud of the fact that most of our placements come as the result of referrals from satisfied clients.

New openings come across our desks daily from companies large and small, in research, development, design, manufacturing and administration. Knowing where the openings are has made us and kept us one of the leading Professional Placement Consultants in New England. **For those wishing to locate outside New England, we are part of the National Personnel Consultants network of over 100 independently owned agencies covering the entire country.**

This is a partial list of available engineering openings representing just a few of the outstanding positions currently available with client companies.

CHIEF PROGRAMMER 24-28K

Rapidly growing division of Fortune 300 electronics company—the current leader in state-of-the-art programmable controllers for the process control industry. You will select and manage a group of six programmer/analysts engaged in developing software for a new product. This position will require close interface with both hardware and manufacturing engineering departments. Experience with operating systems, assemblers, compilers, mini/micro programming.

DATA COMMUNICATIONS 20-26K

Newly opened facility for research and development. This modern building houses the engineering teams designing the latest equipment for high speed data communications. Your experience with protocols, drivers and packet switching is in demand as this company seeks to add significantly to their software staff. Suburban location assures pleasant, short commute.

SR. SOFTWARE SYSTEMS ENGINEERS (3) To 32K

These newly created positions are designed to add substantial depth to the software development capability of this industry leader. The individuals selected will participate as senior members of the software and systems development organization and will act as technical leaders in data communications, operating systems, or diagnotics. You will be responsible for initiating software systems design concepts for product architecture and influence decisions at both the product design and planning levels.

SOFTWARE SYSTEMS PROGRAMMERS 24-32K

Blue chip consumer products company currently undergoing major expansion in the real-time industrial controls area. These are ground floor opportunities to be involved in all phases of minicomputer industrial control system design and implementation. Facility is ideally located in low cost of living area accessible to some of the finest recreational facilities in all of New England.

SOFTWARE ENGINEER 20-24K

Minicomputer manufacturer, division of Fortune 100 company. Assignment in Advanced Development will involve you in the detailed design, coding and debugging of system generation, initialization and recovery procedures in an on-line, multiprocessing transaction oriented system. Liberal employee benefits package including generous education reimbursement.

SOFTWARE SUPPORT To 26K

An unusual position offering extensive travel throughout North America. After a period of formal training at company headquarters you will be the lead person responsible for solution of software problems at the customer site. An in-depth technical (minicomputer) background is important as is the ability to work independently. Good communication skills are essential.

If you're considering a career advancement move at this time, send your resume to Dan Meagher, today, or call him collect at 617-329-2660.

E.P. Reardon Associates

888 Washington Street, Dedham, Mass. 02026 (617) 329-2660

Data Communications Writers

Our Corporate Headquarters' Technical Publications Department has several positions for qualified writers experienced in data communications documentation. Projects include researching, organizing, and writing communications-related users' manuals, systems analysts' manuals, and data sheets for Wang's Word Processor Systems, Office Information Systems, and Computer Systems.

Candidates should have two or more years technical writing experience with concentration in one or more of the following areas: BSC protocols (including 2780, 3780, 3741, or 3270), SDLC, or SNA. Bachelor's degree required; advanced degree a plus.

These positions offer career opportunities at Wang. We emphasize high quality documentation and provide an excellent working environment with complete hardware/software accessibility. Competitive salary and excellent benefits package. Please submit your resume, including salary requirements, to Linda G. O'Connor, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851.

Computers

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S.E. based billion $ client is forming a new commercial word processing div. Seek a professional to assume responsibility for Engineering, Software & Systems Engineer, as well as coordinate the activities necessary to "get the product to market." Hardware already in place. Indiv will immediately begin building a Software staff w/multi-million $ budget. Req similar exp in start-up environ w/word processing or micro computer bkgd. Excellent growth. Highly visible mgmt position. Client co pays all emp expenses. **Call Ron Spang. (404) 393-0933 or send resume to:**

FOX-MORRIS

Personnel Consultants
47 Perimeter Center East, NE
Atlanta, GA 30346

PROGRAMMER/ANALYST

To wire, test, debug and implement programs and determine systems specifications. Knowledge of COBOL, IBM utilities, structure programming, IBM 370, DOS/VS, batch processing required. 2-4 yrs. related programming experience. 2 yrs college education in computer sciences or finance but degree not required. Salary $16,000 per yr., 37½ hr. wk. Send resume in confidence to:

Personnel Dept.
NEW ENGLAND BANKCARD ASSOCIATION INC.
1 Broadway
Cambridge, Ma. 02142
An Equal Opportunity Employer.

PROGRAMMER/ANALYST

One of the nation's largest full-service restaurant companies is seeking data processing professionals with a minimum of 3 years experience in COBOL programming and systems design in a 370 environment for project responsibility in our IBM OS/VS1 Shop. Exposure to POS devices helpful. We offer competitive starting salaries, extensive benefits, challenging work environment, and north Dallas location. Send resume w/salary history to:

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(214) 387-5171

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programmers

There's More to Systems Programming Than MVS, MVT, SVS and VM.

A system programmer's career depends on a thorough working knowledge of the major operating systems. But career *growth* depends upon an opportunity to learn, and an opportunity to progress. And both of those factors exist in unlimited dimensions at the Amdahl Corporate Computer Center. This 24-hour-a-day facility offers exposure to, and hands-on experience with, a multiple CPU environment at the very highest state-of-the-art. As soon as you're ready to take the next step in your career, Amdahl will provide the assignment. It all starts right here, at our Corporate Computer Center in Sunnyvale, CA, a facility devoted to a company whose business is computers.

SYSTEMS PROGRAMMERS

We seek Systems Programmers with a minimum of 1-2 years' experience in one or more of the following areas:

- **MVS or VM System Generation and Maintenance**
- **Performance Measurement and Tuning**
- **MVS Internals**
- **VM Internals**
- **3850 MSS Support**
- **3705/EP/NCP/SNA**
- **VTAM TCAM**
- **DBMS Support**
- **TSO/SPF, CMS**
- **BAL, JCL, SMP**

Join a progressive company with career opportunities better than any you've ever seen. Qualified candidates are invited to indicate 753-E on their responses and direct them to Employment Department, Amdahl Corporation, P.O. Box 5070, Sunnyvale, CA 94086. We are an equal opportunity employer.

amdahl

Computer Facilities Managers

Wang is expanding its network of customer support computer centers to accommodate its rapidly-growing customer base. Each of these facilities will be equipped with state-of-the-art hardware and software and will be an integral part in the testing and introduction of advanced techniques in data processing, telecommunications and word processing.

As a computer center manager, you will be responsible for total administration of the facility including operations and scheduling of the equipment and other resources. You will also be interfacing with customer top management as well as technical staff and our own sales people.

The ideal candidate will have the following qualifications:

- The ability to perform effectively without constant supervision and to communicate with top management and salespersons.
- Experience as a mainframe user in systems, programming and operations with supervisory responsibilities.
- Familiarity with 370 COBOL, RPG, BASIC and ASSEMBLER as well as multi-industry general accounting applications, interactive systems, telecommunications and data base concepts.
- A customer support background as well as a B.A. or B.S. degree is desirable.

Openings currently exist in a number of desirable locations throughout the United States for candidates interested in a true ground-floor opportunity.

Excellent salaries and benefits. Send resume including salary history to: Merle Halverson, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851.

Computers

WANG

Word Processing

We are an affirmative action employer.

SYSTEMS PROGRAMMERS

SPERRY UNIVAC In Salt Lake City

Has current openings for Systems Programmers in the following areas:

MINI-COMPUTER OPERATING SYSTEMS

and

MINI-COMPUTER FILE MANAGEMENT SYSTEMS

Positions require assembly language programming experience and familiarity with display terminal systems. Will participate in functional definitions, detail design, coding, and test and integration.

We offer an excellent benefit package consisting of: Comprehensive medical and maternity; Life, Dental and travel insurance programs; Retirement plan, Accident and sickness, sick leave and long-term disability (income protection); Paid holidays and vacation; Educational reimbursement; Company-sponsored training programs.

Call toll free: 1-800-453-4534 or, send resume complete with salary history to:

Employment Department
322 North 2200 West
Salt Lake City, Utah 84116

EQUAL OPPORTUNITY EMPLOYER M / F

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State-of-the-Art Challenges In Computer Science

Perkin-Elmer is a rapidly growing leader in the design and manufacture of minicomputer systems and sophisticated technology-based products used by a wide variety of industries. The Computer Systems Division is responsible for designing and developing the architecture for the first 32-bit minicomputer ever introduced. The resounding success of our new series 3200 has reemphasized our position as the world's leading supplier of 32-bit minis. Our continuing steady growth has created stimulating career opportunities in research and design for computer scientists with experience in operating systems, data base management, and contemporary computer systems architecture.

Data Base Technologist

This individual will investigate and implement advanced DBMS techniques, structures, and support systems. Candidate must:

- **be competent in implementation and use of data base technologies including Relational and Distributed DBMS.**
- **have relevant MS degree or equivalent experience.**

Concurrent Language Technologist

This individual will investigate and implement advanced compiler and language concepts for construction of systems — particularly — distributed systems. Candidate must:

- **be competent in design and use of high level implementation languages — preferably PASCAL**
- **have a relevant Ph.D. or equivalent experience.**

Perkin-Elmer's Computer Systems Division is located on the temperate Jersey Shore where diverse cultural and recreational opportunities can accommodate almost every lifestyle. We offer excellent salaries and a comprehensive benefits package. If you wish to work for a company that truly believes individual career development and technological innovation go hand in hand, please call collect or send your resume to: Mr. Bill Beattie, (201) 747-7300, Perkin-Elmer, Computer Systems Division, 106 Apple Street, Tinton Falls, New Jersey 07724.

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CRT Terminals

This position involves the management of all sales and marketing activities for our Teleray (CRT Terminals) Division. The primary objective of the position is to provide leadership and planning, developing and managing the division marketing and field sales organizations to achieve short range sales and long range corporate growth plans. The current organization consists of an in-house staff of 5 professionals and an external network of distributors and field representative organizations. A business or engineering degree with extensive management experience in the CRT terminals industry is required. This is a Minneapolis based position. Research, Inc. is a designer and manufacturer of CRT terminals, currently employing 270. Please send your resume to Steve Ross, Research, Inc., P.O. Box 24064, Minneapolis, Minnesota or call collect (612) 941-3300.

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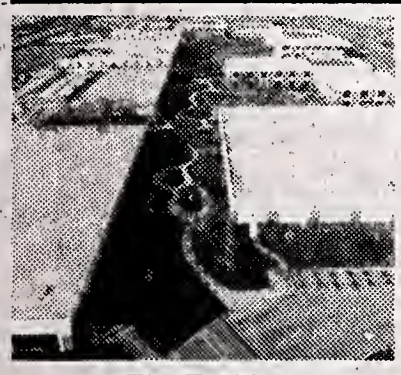
Volume 2
Number 1
The Amdahl Newsletter

Engineering Software Is Seeking Computer Professionals

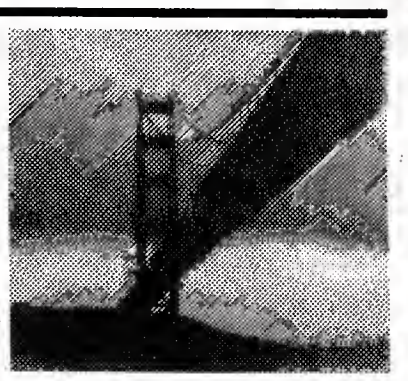


The Facility

- Dedicated to leading the industry in high-speed general use computers.
- In just over seven years the 1978 revenues exceeded $320 Million.

The Work Environment

- Use software development tools like UNIX and C.
- Use top-down structured design and implementation.
- Terminals in offices.
- Work in teams.
- Challenging projects.
- High quality people.
- Continuous professional training.



The Community

- Located in Northern California on the San Francisco Peninsula.
- Moderate climate with rain in the winter months only.
- Recreational, cultural, educational opportunities among the nation's finest.

Engineering Software Positions

SOFTWARE TOOLS

Join us in expanding our UNIX-based program development environment. We support software development for Amdahl engineers by providing on-line tools that assist in analysis, design, coding, testing and maintenance. Our software engineering orientation includes the areas of compilers, editors, debuggers, code instrumentation, text processing and methodologies.

SOFTWARE QUALITY ASSURANCE

You will develop, coordinate and evaluate hardware diagnostics and console systems. You will interact with field support, system test, and computer development personnel. This position is designed to expose the engineer to a variety of areas of the organization as well as to allow the engineer to contribute technically to Amdahl's state-of-the-art position in the large-scale computer industry.

ENGINEERING SOFTWARE SUPPORT

You will have challenging analysis and design responsibilities with diverse software systems-engineering applications, management information or computer hardware design.

DESIGN AUTOMATION

We are pushing the state-of-the-art in very large computer design with our Design Automation Software System. If you have experience in: AUTOMATED TEST PATTERN GENERATION, SYSTEM AND CIRCUIT SPEED ANALYSIS, DATA BASE DESIGN AND/OR ANALYSIS, LSI LAYOUT, VSAM, or LOGIC SIMULATION, and want to solve challenging problems working with innovative professionals, plan to contact us.

DIAGNOSTIC DEVELOPMENT

Amdahl is committed to the development of state-of-the-art diagnostics for its computer systems. We are looking for DIAGNOSTIC DESIGN ENGINEERS to design and implement Hardware, Architectural and System level diagnostics. If you have experience in programming and a sound knowledge of Digital Logic Design and Large Computer Organization, we would like to talk to you about some very challenging positions.

CONSOLE SOFTWARE DEVELOPMENT

You will develop an operating system and hardware control program for our mini-based consoles. You should have experience with small operating systems and an interest in man/machine and software/hardware interactions.

OPERATIONS SUPPORT

You will provide systems solutions for our expanding Operations and Applications Development activities. And will participate in teams developing support technology for our software development organization. A familiarity with data-base management is desired.

SOFTWARE DEVELOPMENT MANAGERS

Amdahl is known for its management strength as well as its technological strength. We are dedicated to the continued education of our managers. We have openings for first-level managers in engineering software development. Applicants should have demonstrated leadership ability with a background in engineering or software development.

Qualified candidates are invited to indicate WM-E on their responses and direct them to Employment Department, Amdahl Corporation, P.O. Box 5070, Sunnyvale, CA 94086. We are an equal opportunity employer.

amdahl

Head, Library Systems Department
University of Massachusetts Library

Administers the Library Systems Department under the general supervision of the Director of Libraries; acts as head of the department, including planning and directing operations, assigning tasks, training, evaluating results, and improving on-going systems where necessary. Also designs and evaluates new systems and procedures; coordinates departmental activities with users; and provides for documentation. Performs related duties as required. Position requires Bachelors degree and five years of experience in systems analysis and library automation, administrative ability, the ability to work well with people in varied organizational relationships, a knowledge of or experience with Data Communications and willingness to work other than the normal working day. Knowledge of or experience with Data Base Management Systems and Masters Degree in Library Science desirable. Please send resume and salary history to: Richard F. MacDonald, Business and Personnel Manager, University of Massachusetts Library, Amherst, Massachusetts 01003. The University of Massachusetts is an Affirmative Action/Equal Opportunity Employer.

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IMS systems & file design 370 OS or MVS, JCL, COBOL.	
Programmer Anal.	**To $18,000**
COBOL Mfg shop. Any equipment	
Systems Programmer	**To $25,000**
BAL either DOS or OS, JCL exp.	
Jr. Programmer	**To $16,000**
Min 1 yr COBOL or BAL exp.	
RPG 2 Programmer	**To $20,000**

Many other positions available
Reply confidentially

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3814 Walnut St.
Harrisburg, PA. 17109
Patti Haines (717) 652-8902

DATA PROCESSING INSTRUCTOR WANTED

Applicant should have Bachelor's degree in Computer Science or equivalent (Master's preferred) and five years minimum work experience in field; should be proficient in RPG, COBOL, and BASIC or FORTRAN; teaching experience not required but preferred. Salary range: $13,500+ for 9 months to $20,000 for 12 months, depending on degrees and teaching experience. **Send resume by June 15 to D.F. Rios, Vice President and Dean of the Vocational-Technical Division, (512) 541-1241, ext. 266, or Pat Hobbs, Associate Dean, ext. 431, Texas Southmost College, 83 Fort Brown, Brownsville, Tx. 78520.** Board of Trustees has right to accept or reject any or all applications. T.S.C. Is an Affirmative Action, Equal Opportunity Employer M/F/H.

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MIS PROFESSIONALS
Florida Location

Harris Corporation is an established (Fortune 500) leader in Communications and Information Processing. Our Corporate Headquarters has been relocated to Melbourne, Florida, and a Corporate Information Processing Center has recently been established. The following immediate career opportunities exist for experienced MIS professionals.

TELECOMMUNICATIONS MANAGER: You will be responsible for the managing of the analysis, design, implementation, and maintenance of a communications network servicing Corporate Headquarters and divisions. The position requires a high degree of technical expertise encompassing voice, data, administrative message, and facsimile transmissions. There will be a close liaison with Harris Product Development personnel to enable optimum use of developed technology in Communications. Electrical Engineering degree or equivalent and minimum of ten (10) years experience in the design, development, installation, and maintenance of Communications Network desirable.

PERFORMANCE MEASUREMENT ANALYST: Extensive experience in the use of hardware and software monitors for the purpose of acquiring data on the operation of large scale IBM systems. Knowledge of OS/MVT, VM, MVS desired. Ability to write reports and make presentations required.

TELEPROCESSING SOFTWARE SPECIALIST: Experience in installing, maintaining, and tuning of teleprocessing software monitors and applications programs. Prefer experience with SHADOW teleprocessing monitor.

SENIOR SYSTEMS PROGRAMMER: Experience with IBM operating systems software in the generation and maintenance of either OS/MVT, SVS or MVS using HASP, JES2 or JES3. Also experience in hardware/software evaluations and recommendations.

SYSTEMS PROGRAMMER: Heavy experience in systems programming with OS/MVT, OS/VSI, OS/MVS. Specialization in Teleprocessing support with systems such as SHADOW, CICS. VTAM and NCP experience desired.

MIS SUPPORT SPECIALIST: You will be responsible for assisting our decentralized divisions in: resolution of problems, analyzing job stream requirements, work flow scheduling and design and analysis of data base systems. You should possess a degree plus 4 years experience in business systems and COBOL programming, preferably in an O/S JCL environment.

DATA BASE SPECIALIST: Detailed knowledge of modern data base technology and experience in implementing applications to run in a data base environment. Knowledge of IDMS desired.

ANALYST/PROGRAMMER: Experience as a project leader for computer job accounting software system. COBOL and Computer chargeout experience necessary. Experience with Johnson Systems accounting package desirable.

APPLICATION PROGRAMMER/ANALYST: Minimum three years experience ANS COBOL. Medium to large scale IBM OS environment. Good knowledge of IBM OS/JCL; good communicative skills and experience with financial and/or manufacturing systems. Approximately 25% travel.

In addition to excellent salary, benefits and liberal relocation assistance, these are high visibility growth situations in one of the nation's most desirable locations.

For immediate consideration, please forward resume and salary history in confidence to: Manager, Corporate Staffing, Harris Corporation, Melbourne, Florida 32919.

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Design Microprocessor-Based Data System for A World Leader in Medical Insurance Instrumentation
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- Data base file handling
- Operating system design
- Statistics and probability distributions

A BSCS degree or equivalent plus experience is needed. The prime adjustment assignment will be design and implementation of data storage and retrieveal systems. In addition to attractive salary, benefits, and conditions, the position affords much room for contributions.

Please send resume, indicating salary record, in confidence to:

Personnel Dept
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SCIENTIFIC PROGRAMMER

Kitt Peak National Observatory

Position involves the design, programming and implementation of data reduction and analysis software. Experience in numerical methods required and background in astronomy or digital image processing of astronomical data desirable. Experience in supervising software projects desirable. Requires at least 4 years programming experience and either an advanced degree in the physical sciences or equivalent experience. Salary: $19 - 25K, with liberal fringe benefits. **Send resume including salary history and requirements to Personnel, Kitt Peak National Observatory, P.O. Box 26732, Tucson, AZ. 85726.**

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ATLANTA, GEORGIA
SYSTEMS ANALYST'S

Fulton National Bank is looking for Systems Analyst's with 5-10 years experience, proficient in COBOL and have a knowledge of demand deposits, savings, and installment/commercial loan applications.

If you have this background call **Erwin Fraas** or **Donna Raynor** collect at **(404) 529-4284.**

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Medium size company needs manager to take charge of Burroughs 1855 installation and supervise the complete redesign, development and installation of new system and to link remote locations in due course. Desirable knowledge and experience: ANS Cobol, data communications, CMS, data base management, general business, financial and manufacturing systems applications.

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797 Washington St.
Newton, MA 02160

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COBOL

Professional positions with the Attorney General, Bureau of Criminal Investigation. Responsibilities may include being section leader in the development of complex programs for specialized applications. **Send resume to BCI&I, Box 365, London, Ohio 43140** or call **614-466-8204**. "An Equal Opportunity Employer"

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DP Mngr Small Shop	$25,000

Contact a proven D.P. Specialist, Helen W. Miller, CEC, (803) 782-9230. **DUNHILL OF COLUMBIA**, 4700 Forest Dr., Suite 217, Columbia, SC 29206.

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Applicants must have proven ability and experience in the discipline for which they apply. Salaries will be commensurate with those abilities and past experience.

Candidates challenged by the expanded possibilities in both the Data Processing and the Health Insurance fields are invited to forward resumes to: Employment Dept, DP 631.

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If so, then join us at Tymshare Transaction Services. We are a fast growing company seeking individuals interested in participating in this growth. The organization is entering a distributed environment including remote processing centers with telecommunication networking and distributed data entry in a rapidly expanding financial market.

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Search Committee,
Computer Center Director
c/o Mr. Dean S. Nye
The State Univ. of N.Y.
Binghamton, N.Y. 13901
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- Product Evaluation
- Problem Solution

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- Systems Engineering
- Signal/Data Processing
- E-O Sensor Systems
- Cryogenics
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- Control/Imaging Systems

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Call us at **(213) 391-0543** or send your resumé to: Professional Employment, Hughes Electro-Optical & Data Systems Group, Research and Development, 11940 W. Jefferson Blvd., Dept. CW, Culver City, CA 90230.

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PROGRAMMER ANALYST

Cutler-Hammer has recently relocated its aerospace switch facility to the Bradenton/Sarasota area, and is seeking qualified candidates with a minimum of 3 years RPG II programming experience. Successful applicants must have exposure to manufacturing systems, data base file concepts and be capable of working with Bill of Materials in a routing environment. CCP programming for teleprocessing a plus. Competitive salary and benefits.

Consider a change and send your resume and salary history to:

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WE ARE LOOKING FOR PROGRAMMER/ANALYSTS

Score yourself from 1 to 10 on each point.

1. I am a good COBOL programmer
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If your total is 75 or better, call or send resume to:

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Denver, CO 80201
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SCIENTIFIC COMPUTING ANALYSTS

The Center for Naval Analyses, a private research organization has immediate openings for talented individuals with experience in computer programming and analysis for statistical and information sciences applications.

Your responsibilities will include:
- **Analysis and programming for naval studies**
- **Consulting and assistance for users**
- **Conducting seminars and short courses**
- **User manuals and program documentation**

The successful candidate must have bachelor's or master's degree in statistics, information science, mathematics, computer sciences, or a related scientific field, as well as experience in scientific programming and a good working knowledge of COBOL, FORTRAN or APL. Excellent communications skills and an ability to work with a multi-disciplinary professional staff are required. The positions are ideally suited for self-starting individuals willing to take on immediate responsibility.

CNA will soon be located in an attractive suburban setting in Alexandria, Virginia, with easy access to the nation's capital by metro rail. CNA, which has done operations research and systems analysis for the Navy since 1942, offers outstanding opportunities for professional growth with a stimulating professional environment and state-of-the-art software and hardware systems, as well as excellent educational, leave, and retirement benefits.

If you are interested, please send your resume and salary requirements, in confidence to:

CENTER FOR NAVAL ANALYSES
Attn.: D.P. Moke
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PROGRAMMER/ANALYST

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Requires expert ability in ANS COBOL. Knowledge of RPG II and Basic Assembler Programming languages and DOS preferred..

Should have knowledge of DP applications in some or all of these areas: cost and general accounting, production and manufacturing control sales and marketing and product and industrial engineering. Qualifications includes BS, BA or BBA.

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SYSTEMS ANALYSTS
New Orleans

The New Orleans office of Sperry Univac is actively seeking two Systems Analysts with previous experience in a savings and loan environment. To qualify you must be knowledgeable in COBOL and have a minimum of 2 years experience. A degree in computer science is a plus.

This is an exciting opportunity; one which will provide an outstanding career path. An excellent starting salary and fringe benefit program is offered.

Please send your resume or call:

Leonard Stein
Systems Analyst Manager
7600 Airline Highway
Baton Rouge, Louisiana 70814
(504) 924-7211

All replies will be held in strictest confidence.

SPERRY UNIVAC

Sperry Univac is a division of Sperry Rand Corporation
Making machines do more so man can do more
An Equal Opportunity Employer M F

Staff Assistant,
Programmer Analyst

The primary responsibility of a qualified applicant is designing and coding in COBOL, new administrative applications, and assisting the Director of Computer Services in all related tasks. Requirements: Bachelors' Degree plus COBOL experience. Knowledge of Fortran, Compass, Basic, Control Data Cyber 72, higher education experience desirable. Salary range 10-20k. Apply in writing on or before June 15, 1979 to:

Roy Hall, 3d
Dir. Computer Services
Fitchburg State College
Fitchburg, MA 01420

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Salary commensurate with experience.

If you have this background call Bob Turner or Donna Raynor collect at (404) 529-4284.

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Progressive local government has immediate need for Programmer Analysts. Current hardware 370/145 with new equipment scheduled for mid-1980 delivery. Position requires proficiency in COBOL, CICS, DL/1, and DMS/VS is a plus. We offer competitive salary and relocation expense will be paid. For prompt consideration please forward resume and salary history to:

Personnel Department
Jackson County Courthouse
415 E. 12th St.
Kansas City, Mo. 64106

A SYSTEMS ANALYST position is available in the Developmental and Special Services Division of WVNetwork for Educational Telecomputing. Requirements include technical competence (no supervisory responsibilities) at the Bachelors degree level in a scientific or business discipline; three years work experience in programming or analysis (prefer PDP-11 experience - particularly RT-11 and RSTS/E). Salary open. **Apply by June 1, 1979 to Judy Martin, WVNetwork, 837 Chestnut Ridge Road, Morgantown, WV 26505.**
Affirm. Action /EOE

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Sun Banks of Florida, Inc., a progressive bank holding company, has an immediate opening for an EDP Auditor. Required knowledge and experience are: a college degree and one or more years experience in EDP Auditing. Knowledge of COBOL, banking systems, CARS audit software, or Honeywell equipment would be a plus. Please send resume and salary requirements to the attention of:

Frank W. Lyons
EDP Audit Manager
P.O. Box 3042
Orlando, Florida 32802

Programmer/Analyst
Pacific Northwest

Fischbach/Lord Electric Co. currently has an opening for a Programmer/Analyst With An A.A. Degree or equivalent exp. in RPGII, COBOL, TSO, and MVS JCL. MARK IV a plus. Construction exp. desirable but not required.

Send resume to:
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Fischbach/Lord Electric Co.
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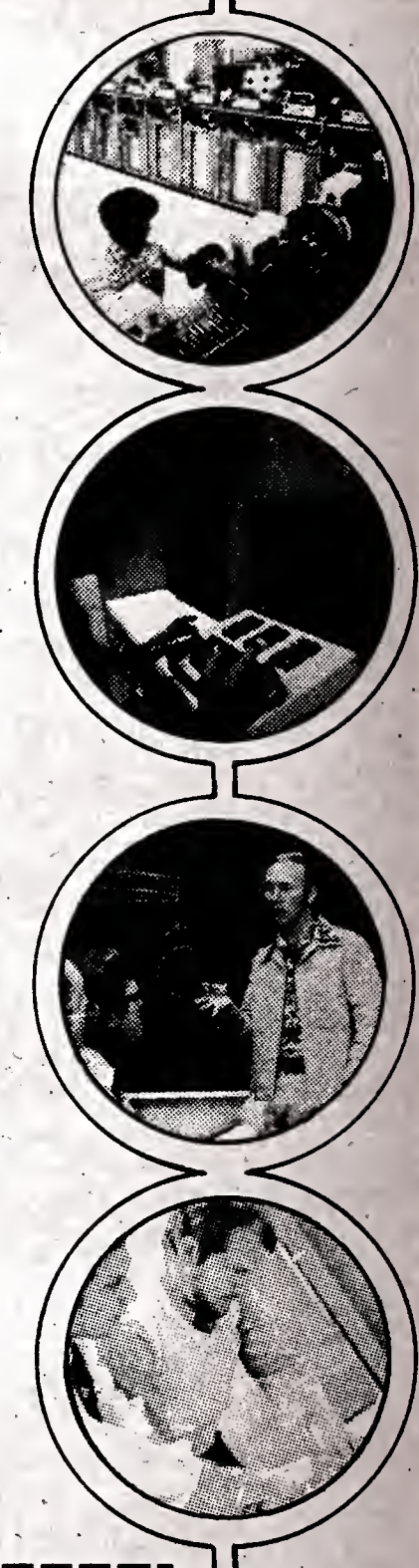

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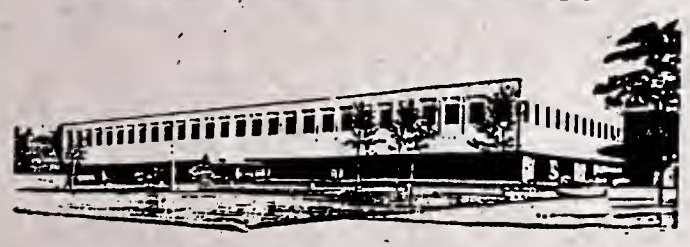

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If you have these credentials, we have an exceptional career for you at STC.

For fastes consideration with absolute confidentiality send your resume to:

Bill Walbel Dept. CW/5-21 MD-3K

STORAGE TECHNOLOGY CORPORATION
2270 South 88th Street
Louisville, CO 80027

OR

Give Bill a call TOLL-FREE at 800-525-2940 ext. 6551 or Fred Moore ext. 3008 for further information. We have a lot to say that you'd like to hear.

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Senior Systems Programmer (CICS)

We're one of the world's largest Master Charge and Visa processing centers. And we've doubled our sales in the past two years. But those are only two good reasons for joining Eastern States.

You'll also work in a state-of-the-art systems environment — while enjoying a fully competitive salary, top benefits, and the opportunity to make the most of your skills in a company that promotes from within whenever possible.

To qualify, you should have 2-5 years of experience as a CICS systems programmer in an IBM OS environment. Knowledge of assembler language is also necessary.

Learn about the exciting future that's waiting for you at Eastern States. Send your resume and salary history to: Bonnie Mason or call collect, (516) 488-1177.

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Four Ohio Drive
Lake Success, N.Y. 11042

An Equal Opportunity Employer, M/F

ES

DATA COMMUNICATIONS

Our computer services department in San Francisco has openings for engineers and analysts with experience in designing, installing, and maintaining data communications networks in an IBM environment. Responsibilities include: Planning and design of data communication systems, analysis of data communications hardware, software, and networks, coordination of systems installation, solving data communications problems and troubleshooting data communications networks. If you are looking for a challenging opportunity with growth potential in a fast growing area, please send your resume with salary history and requirements to:

Standard Oil Company of California
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DATA PROCESSING

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...and it's time for you to TAKE ACTION on your career, by talking to our DP management about one of the following outstanding career opportunities:

SUPERVISOR, OPERATIONS

Highly challenging position that involves supervision of the Computer Operations, Scheduling and I/O activities of Data Processing Operations. Individual will also provide Operations Analyst support when required by existing procedures. Successful candidate will possess technical training equal to 2 years college in data processing or related area; 3—4 years experience in a position requiring knowledge of Computer Operations, Scheduling, I/O Control, and documentation standards; and at least 1 year supervisory experience in Computer Operations.

SOFTWARE ANALYST

Individual will be responsible for performing programming and analysis activities in the software and internal application project areas. Will also provide problem resolution support for the above sets of programs when needed. A minimum of 4 years software experience in a DOS/VS environment with Data Base is essential.

PROGRAMMER ANALYSTS

Here is an opportunity to develop, code, test, design, debug, implement, document and maintain business data processing programs in a DOS/VS COBOL environment. Opportunities exist for individuals with varying degrees of COBOL experience in manufacturing, financial, CICS and other applications. For some positions, data base and on-line (CICS) background is necessary.

SYSTEMS ANALYSTS

We seek individuals to design, debug, code, coordinate, implement, maintain and document financial Business systems. Varying degrees of COBOL experience necessary; BAL, DBOMP, or CICS would be a plus; applications range from engineering to manufacturing to accounting and more.

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Accomplished professional needed to support the activities of DP Operations, perform and coordinate Production Program Revisions and Implementation, enforce documentation standards and maintain production libraries. If successful, you will also interface with inter-departmental areas for originating MIS department procedures.

We offer project team involvement, diversified responsibilities, competitive compensation and benefits packages, company-paid relocation, and excellent opportunities for learning and growth.

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For an interview with our Data Professionals, please send resume, indicating your area of interest, to:

Employment Manager, Dept. C 521
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Defense Systems Division
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equal opportunity employer m/f

NORTHROP

Data Processing

SENIOR SYSTEMS ANALYST

We are the leading manufacturer of hand-held air power tools. Our current opportunity is the result of staff expansion designed to provide full data processing support to our manufacturing, sales and field activities.

The qualified applicant will possess heavy programming experience preferably with on-line CICS background and will enjoy an excellent salary and benefit package, as well as the opportunity for personal and professional growth.

Interested candidates may send resume, including salary history to:

Manager of Compensation
Chicago Pneumatic Tool Co.
501 Bleeker Street
Utica, NY 13503

An Equal Opportunity Employer M/F

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To participate and design our floppy disc drive controller, assist in selection of microprocessors, write firmware and participate in the debugging of controller. BS/MSEE or Computer Science required, compensation for this position ranges from 16K-20K depending on education and applicable experience.

Send resume including salary history, to: Jerry Haynesworth, Honeywell S/MISD, 300 Concord Road, Billerica, MA 01821.

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C.S. Guyer
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7995 E. Prentice Ave.
Englewood, CO 80111

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At CRAY RESEARCH INC. we design, build, market and support Super Scale computers used in scientific application..We currently have openings for the following:

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Immediate opening for a talented computer professional for assignment at several sites. Several years experience on large-scale computer systems a valuable plus. After several months training on the Super Scale CRAY 1, the successful candidate will be assigned to a customer site.

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This person will be instrumental in all phases of developing courses for customers and employees. This instructor will develop peripheral courses and monitor students during their hands-on training period. The applicant should have a minimum of 2 years teaching experience and 2 years maintenance experience on large scale computer systems. Writing exposure is a plus. Location is Chippewa Falls, WI, one of Wisconsin's most attractive and scenic recreational areas.

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A.E. Kennedy

CRAY RESEARCH INC.

1440 Northland Drive
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CRAY RESEARCH, INC.

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Director: Develop nat'l, turnkey system, market program — **$45K**

EDP Auditor: Heavy math, IMS & 370 exp. Fortune 500 Corp. — **$30K**

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Program Analyst: Simulation Fortran/Assembly. Expansion — **$25K**

System Engineer: Real-time; micros H/W - S/W Integration — **$24K**

Program Analyst: HP 3000 Cobol RPG fin. apps. — **$24K**

Send resume and salary history to:

Technical Recruiting Dept.
C/M of Orlando
3101 Maguire Boulevard
Orlando, Florida 32803
(305) 894-6551

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AS SPECIALISTS IN SYSTEMS AND TELECOMMUNICATIONS

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call or send resume stating area of interest.

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(212) 697-3300

SYSTEMS PROGRAMMERS

International Paper Company has immediate openings for System Programmers to work in our southern regional computer center in Mobile, Alabama.

We seek qualified individuals with a minimum of two years experience as a systems programmer actively supporting MVS, TSO, VTAM or TCAM.

International Paper offers above average benefits, relocation expenses, and an excellent work environment. Please send resume, salary history, and salary requirements to:

INTERNATIONAL PAPER COMPANY

Jerry T. Upchurch
Supervisor Technical Devel.
International Paper Company
P.O. Box 2987
Mobile, Alabama 36601

CAREER OPPORTUNITIES AT

AVCO COMPUTER SERVICES

Avco Computer Services operates one of the largest and most successful data centers in the area utilizing the equivalent of four IBM 370/158 computer systems operating under MVS and JES2. We are a dynamic and expanding organization requiring personnel interested in new challenges and professional growth. Immediate opportunities exist for the following candidates:

● COMPUTER SERVICES MARKETING REPRESENTATIVES

If you have a proven track record in the sale of hardware, software or services, we have some outstanding opportunities available to you at Avco Computer Services. Don't wait until tomorrow for your reward. Join a dynamic organization today, where success is a way of life.

● SENIOR EDP SYSTEMS ANALYST

Working as a member of our Management Systems Design staff, you will assist various managers in applying technology to satisfy data processing requirements. Assignments will cover the planning, design, development and implementation of business systems and will require expert knowledge of advanced computer systems technology. Our candidate must be able to lead the development and application of advanced techniques in the management systems field. Experience with financial or manufacturing systems preferred.

● SENIOR PROGRAMMER ANALYST

As a key member of our Systems Development staff you will be challenged by a variety of assignments in business applications development and implementation. Our environment includes multiple IBM 370/158's operating under MVS.

The successful candidates must have several years experience in programming with a good working knowledge of ANS COBOL and at least one other programming language. Exposure to commercial software packages and data base or file management systems is desirable. A Bachelor's degree is required.

SENIOR SYSTEMS PROGRAMMERS

Challenging and rewarding work supporting the following IBM operating systems:

• MVS/TSO/JES 2 • VSI • DOS/VS

Primary responsibilities will include system generation, system testing, performance tuning, troubleshooting and system maintenance. To qualify candidates should have at least 3 years IBM systems programming experience, preferably supporting MVS or SVS.

● TECHNICAL SUPPORT REPRESENTATIVES

Technical support of our diversified and growing user community requires individuals who enjoy communicating with other people and staying technically current. Activities include consulting, education, conversions, benchmarks, troubleshooting, demonstrations and product support. The preferred candidates should have at least 2 years in FORTRAN and graphics software. Experience with DISSPLA, CALCOMP software and interactive Tektronix graphics would be advantageous.

● TECHNICAL WRITERS

Responsibilities will include the writing and publication or our user guides, newsletters and technical updates. Candidates should have professional writing skills in the area of computer software and at least 2 years experience in technical writing. Experience using an IBM 370 system, especially programming experience, would be helpful.

Ideal working conditions exist in our modern facility located only 2 minutes from Route 93 at Exit 12. You will enjoy a liberal benefit program including tuition assistance, life and group insurance including a comprehensive dental plan.

Kindly send your resume including salary requirements to: Mr. Peter C. Dowd, Employment Supervisor

AVCO COMPUTER SERVICES
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WILMINGTON, MASSACHUSETTS 01887
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Our rapidly growing airline is seeking active career-minded computer professionals who are looking for opportunity and responsibility. We have openings in the following areas:

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6 months to 2 years experience RPG, COBOL helpful.

Computer Operator
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We offer competitive salaries and excellent benefits including credit union, life, health and dental insurance. Also, airline travel privileges.

Send salary history and resume to Pete Simmons at:

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Marana Air Park
Marana, AZ 85238

or call: (602) 682-4181.
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PROGRAMMER ANALYST

Northwest Arkansas manufacturing firm is seeking an individual with experience in COBOL and JCL. UNIVAC-9030 experience desirable.

Send resume to:
Jet Stream Plastics
P.O. Box 190
Siloam Springs, AR 72761
Attn: D.P. Manager

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Programmer — 40 hour week — $13,500 annual salary — excellent working conditions with location on western side of downtown St. Louis. Flowchart, test, debug and document new COBOL programs, as well as debug and modify existing programs. Must operate computer. B.S. Computer Science or math required. No previous experience necessary.

Send resume to

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Would you like to develop and install fresh, current state-of-the-art Administrative Business Systems? We are staffing a young Systems and Programming function in a 90-year old, well-founded and growing company. The headquarters is located in an open, clean, environmental playground that provides an excellent place to live and raise a family. If you have successfully developed, programmed and installed a variety of Administrative Systems and want to relocate to Northern Michigan, respond in confidence defining salary requirements and experience to:

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Newton, MA. 02160
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SYSTEMS CONSULTANTS

SALARIES FROM $18 to 35,000

The Battelle Computer Systems Section, a world leader in research and development of computer and information sciences is looking for well-qualified individuals who possess a B.S., M.S. or Ph.D in Computer and Information Sciences or a related field with excellent marketing, people, and communications skills.

Additionally, a strong background in computer and information processing and a demonstrated ability in performing consulting activities, such as requirements analysis, systems design and implementation of complex systems are required with applications and systems experience in either:

- **Human Services Information**
- **Geographical/Census Data/Cartography**
- **Office Automation**
- **Resources and Projects Management**
- **Administration Management.**

We offer along with the salary, exceptional career and professional development opportunities and comprehensive company benefits. For confidential consideration, please send a resume to: Dick Shaw, Personnel Advisor.

Battelle Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201
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Computer Programmer/ Analysts

The Colorado Springs Division of Hewlett-Packard has immediate openings for two Programmer Analysts. Applicants should have a BS degree or equivalent and 3 or more years experience in manufacturing/materials or accounting systems and COBOL.

Hewlett-Packard's Colorado Springs Division can offer you challenge and career growth in a residential community located at the base of Pikes Peak. Colorado Springs has an excellent school system, a low cost of living and almost unlimited recreational advantages including fishing, skiing, skating, hiking, theatre, to name only a few. Our weather is near perfect as the sun shines 300 days a year, our humidity is low and the air is fresh. We're only a short drive from Denver and national professional sports.

We can offer you the chance to make technical state-of-the-art contributions in a results-oriented, yet informal, working environment. Excellent salaries and benefits including relocation assistance plus a secure, no layoff employment policy with unparalleled opportunities for professional growth are key parts of our people oriented philosophy.

Call COLLECT, or send letter outlining experience and salary history, in confidence to:

Mike Kralick
Programming Group Manager
(303) 598-1900

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Data General

To all the Software Professionals who would prefer to consult rather than code – consider Data General Systems Engineering!

Our Systems Engineering organization employs systems consultants nationwide to work with customers in understanding data processing problems and in proposing state-of-the-art solutions. They are also heavily involved in other consultative activities, such as pre-sales technical presentations and proposals.

They work with customers using the latest state-of-the-art software; advanced multi-function operating systems, teleprocessing and powerful data management facilities, as well as the most complete line of high-level languages including PL1, COBOL, FORTRAN V and Basic. With the constant stimulation of new products and customers and the wide variety of applications environments, DG Systems Engineers get the best of both worlds – technical and sales.

Be a Consultant.
Be a DG Systems Engineer.

Systems Engineers

To qualify you need a BSEE or BSCS and two plus years experience with data base systems, telecommunications or operating systems.

We currently have immediate openings throughout the country. To find out more about these positions, contact the regional recruiters listed below (either call collect or send your resume including salary history).

- New England: Joan Vasilopoulos (617) 235-8171, 888 Worcester Rd., Wellesley, MA 02181.
  Cambridge and Wellesley, MA; New Haven and Norwalk, CT.
- Mid Atlantic: Jim O'Sullivan (212) 557-1122, 144 East 44th St., New York, NY 10017
  New York City, Melville, L.I., Westchester, Rochester and Syracuse, NY.
- Federal: DC/MD/VA: Maury Shyne (703) 827-9600, 1757 Old Meadow Rd., McLean, VA 22101.
  Washington, D.C.
- Midwest: Joe Elias (312) 364-3000, 703 West Algonquin Rd., Arlington Heights, IL 60005.
  Columbus and Cleveland, OH; Milwaukee, WI; Chicago and Peoria, IL; and Kansas City, KS.
- South: Rich Brown (404) 448-6072, 6855 Jimmy Carter Blvd., Suite 220, Norcross, GA 30071.
  Memphis, TN; Charlotte, NC; Birmingham, AL; Houston, TX; Tampa, FL; and Atlanta, GA.
- Southwest: Chuck Milleman (415) 856-6060, 2445 Faber Place, Palo Alto, CA 94303.
  El Segundo, Van Nuys, Santa Ana, and Anaheim, CA; and Phoenix, AZ.
- Northwest: Chuck Milleman (415) 856-6060, 2445 Faber Place, Palo Alto, CA 94303.
  Palo Alto, CA; Denver, CO; and [illegible]land, OR.
- Canada: Dale Malpass (416) 25[illegible]-4271, 415 Horner Ave., Toronto, Canada, M8W4W3.
  Montreal, Toronto and Calgary.

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SAN FRANCISCO BAY AREA

SYSTEMS PROGRAMMERS

Large Government installation requires additional system programmers for expanding national tele processing activities. MVS/JES2, TSO, Intercom, and VSPC on an Amdahl 470/V7. Software support activities performed for multi-installations nationwide.

Additional support required in all areas including MVS performance and tuning, operating system maintenance, program product evaluation and maintenance, TCAM, VTAM, and NCP. Minimum two (2) years' experience required with MVS, SVS or MVT including one (1) year TSO.

Excellent Federal Government benefits package. Salary from $22,500 to $31,500. Resume to **Postal Data Center, 850 Cherry Avenue, San Bruno, CA 94097.**

SMALL COMPUTERS REGIONAL SALES MGR $50,000

Our client seeks a sales pro with solid small business computer application sales experience combined with sound EDP technical knowledge, and some management background. Experience in working with dealers as well as end-users is a strong plus. Responsibility will be Eastern U.S. A truly rare opp'ty in a start-up situation offering outstanding potential. Individual can be currently located in Phila to NYC area. **Contact, in confidence, Don Owens, FOX-MORRIS PERSONNEL CONSULTANTS, 1500 Chestnut Street, Philadelphia, PA 19102, 215/561-6300.**

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INFODATA SYSTEMS is looking for top DBMS salespersons for New York and elsewhere. Our sales plan has no ceiling!

If you are currently the big fish in your pond but want to grow even bigger — call Bob Schreier at (703) 578-3430.

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Falls Church, VA 22041

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* SR. PROGRAMMER ANALYSTS & PROGRAMMER ANALYSTS
* SR. SYSTEMS PROGRAMMERS
* SOFTWARE INTERNATIONAL OR MSA PROGRAMMER ANALYSTS
* SR. SYSTEMS ANALYST

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Compensation and benefits offered will more than meet your expectations, plus we provide generous relocation assistance. If you have the qualifications, and are interested in putting them to work toward an exciting new future, we'd like to hear from you. Forward resume, complete with salary details in confidence to:

Pam Tanebe

Carter Hawley Hale Stores, Inc.

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SYSTEM 34 PROGRAMMER ANALYST

The First National Bank of Atlanta offers you the opportunity to join a sophisticated, innovative data processing environment and the security of working for one of Atlanta's leading financial institutions.

We currently have a challenging opportunity for an individual to participate in a long term System/34 development project in support of general accounting applications.

We're looking for:

- System/34 experience including applications design and development in an interactive environment.
- System/34 COBOL preferred, but ANS COBOL acceptable.
- Good working knowledge of OCL essential.
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- MRJE experience highly desirable and experience in IBM 370/OS environment helpful.

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Ms. Maddock
404/588-6040

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Additional Evaluative Factors:

- Familiarity with B-3800 hardware and software including MCP, FORTE/2, NDL and COBOL
- Knowledge of remote terminal networks, California Community College Financial Systems, Project Control and System Implementation
- Skills in user interaction, Documentation and both verbal and written communication.
- Prior involvement in support of Instructional Computing

Present Hardware includes B-3800, HP-3000 and PDP 11/40

Beg. Salary $2176-2399 depending on qualifications. Excellent benefits. Applications deadline June 5, 1979 for August 1 or earlier starting date.

Request application form from
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Personnel Office
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Pasadena, CA 91106
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OBJECT Associates
2800 S. Brentwood
St. Louis, MO 63144
(314) 962-3100

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COMPUTER PROGRAMMER /ANALYSTS

Any combination of training and experience equivalent to a degree in Business Administration, Mathematics, Computer Sciences or related fields plus two years experience with COBOL and/or FORTRAN on large timesharing systems. A background in CDC CYBER hardware with NOS/BE is preferred, but not necessary.

Must be a U.S. citizen.
Replies held confidential.
Liberal fringe benefits.

EQUAL OPPORTUNITY EMPLOYER - M/F

Send resumes to:
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P.O. Box 14400
Las Vegas, NV 89114

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Opening for a bright, programmer/analyst. At least two years experience in Fortran 6 preferably using Interdata hardware. Salary 16,000 to 20,000 per year, excellent benefits.

Please call: area code (303) 623-4227 or send resume to: P.O. Box 1257, Denver, Colorado 80205.

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Wonderful opportunity to grow with a progressive data processing department. Currently using System 3 MOD 12, RPG II, DPF, and CCP. System 38 scheduled for February, 1980. Applicant must have 2 years experience in systems analysis and programming RPG II. Call or write Mr. Young, Personnel Department, 319-234-3630:

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Waterloo, Iowa 50703

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PL/1 PROGRAMMERS

If you are a data processing professional, MCAUTO (a divisional company of McDonnell Douglas Corporation) would like to discuss the opportunities for you in our Business Applications programming organization. MCAUTO is the premier data service firm—a position gained by satisfying clients' needs with experienced personnel, a variety of software systems and vast computer power. MCAUTO is currently expanding its Business Applications insurance support area. Various assignments are available, including programming, analysis, design, and customer support. We are a state-of-the-art shop with IBM 3033's and 370/168's, processing batch, on-line, data base and RJE insurance applications.

Our personnel are located in St. Louis, and support clients nationwide.

Qualified applicants should have experience in business applications programming, two or more years experience with PL/1 and JCL on IBM 360/370 equipment running under OS or VS. One to two years of IMS applications experience especially desirable. Experience in insurance applications is preferred, but not required.

Send your resume and salary history in confidence to:

W. B. Kellenberger
McDonnell Douglas Corporation
Professional Employment (62-2A)
Department C-06
P.O. Box 516
St. Louis, Missouri 63166

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TECHNICAL WRITERS (Hardware and Software)

Losing your edge in technology?

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NCR/Columbia, South Carolina, designs, develops and manufactures microcomputer and data communications products and systems. We are currently seeking Technical Writers for the production of software, hardware and operator publications. Duties include preparation of complete manuscripts on operating systems, software drivers, hardware modules, maintenance procedures, operating procedures, and installation documents on hardware and software products. Qualified candidates should have experience in COBOL programming, system analyst function of field engineering. Prior technical writing experience is preferred.

Please send confidential resume and salary history to: Mr. Ken Uhlig, Engineering and Manufacturing, NCR Corporation, Dept E50, 3325 Platt Springs Road, West Columbia, S.C. 29169.

NCR

Complete Computer Systems

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Systems Management/ Reorganization

MEMPHIS

Our client, a highly respected Memphis headquartered company, has engaged us to recruit two top notch managers for its DP organization which is currently embarking on a dynamic reorganization plan. We are searching for a Manager of Systems Development and a Manager of Technical Support.

The Systems Development Manager will manage the development and enhancement of large scale IBM systems. This person will have previous banking experience and be an effective communicator and organizer.

The Technical Support Manager will have previous experience in an OS/MVS environment and large scale system conversion experience. He or she will be responsible for managing Systems Programmers, the functioning of the internal operating system, all non-application software, performance measurement and tuning.

Each person should be technically competent and possess a general managment perspective. These are both excellent opportunities to join a winning team in one of the most desirable locations in the country. Qualified candidates will be high achievers with potential for future growth. Excellent compensation package, benefit program and relocation are offered.

We are Consultants to Management. For confidential consideration, please send resume and salary history to: **James A. Cox, Professionals for Computing, Inc., One Maritime Plaza-Suite 1350, San Francisco, California 94111 (415) 956-7120.**

professionals for computing, inc.

SYSTEMS AND PROGRAMMING PROFESSIONALS

WOULD YOU BE INTERESTED IN A CAREER INSTEAD OF A JOB?

THE MEDICAL COLLEGE OF WISCONSIN is expanding its Hospital Information Systems Group. Several challenging openings exist for creative dynamic individuals interested in applying leading edge technology to the needs of the health care field. Our systems positions require heavy user interaction. Programming positions require good technical competence with general business exposure. Degreed candidates preferred. Relevant work experience will be considered.

OUR ENVIRONMENT

Suburban Milwaukee Data Center running dual 6 MEG CPU's devoted to online interactive and batch processing systems. Our communication network is supported by one of the finest DBM systems available today. Our Data Center's exceptional design standards and built-in redundancy assures the reliability expected from a leader.

OUR NEEDS

SR. SYSTEMS ANALYST AND SYSTEMS ANALYST

To work in the design and installation of interactive health care information systems. Able to work at a project level with good interpersonnel skills. Two to four years experience on medium to large scale systems desired.

PROGRAMMERS AND PROGRAMMER TRAINEES

Several entry through senior level positions available. Assignments will include both batch and online applications using DBMS. Strong COBOL backgrounds and good communications skills a must.

ANALYST PROGRAMMERS

A stepping stone to the systems environment. You will assist in detail systems tasks while maintaining an active part in application programming and enhancements. You should have a good understanding of online systems with approximately two years of related work experience.

OUR BENEFITS

Second to none, we offer relocation and educational assistance, along with insurance and retirement programs that you should know about.

YOUR NEXT MOVE

Send a copy of your resume to the attention of our Hospital Systems Supervisor for immediate consideration. You will be glad you did.

THE MEDICAL COLLEGE OF WISCONSIN

JOINT COMPUTER CENTER
THE MEDICAL COLLEGE OF WISCONSIN
8701 Watertown Plank Road
Milwaukee, Wisconsin 53226

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SYSTEMS ANALYST/PROGRAMMER

Oberlin College, a private liberal arts college with a FTE of 2700 students, located southwest of Cleveland, is seeking a Systems Analyst/Programmer.

The candidate must have a minimum of three years experience in programming and systems analysis. Systems experience should include responsibility for the development and installation of a major administrative system. The candidate must have highly developed communication skills, verbal and written, and must have written complex COBOL programs. The person selected will be exposed to all areas of administrative processing. A Bachelor's Degree, experience with financial applications, and previous systems experience in an academic environment are desirable. Salary range $14,910 - $22,370 plus liberal employee benefits. Starting salary dependent upon experience and qualifications. Interested persons should submit resume by May 31 to: **George Bosela, Director Systems Development/Programming, Oberlin College, Computing Center, Oberlin, Ohio, 44074.** Position to be filled by July 15, 1979.

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Experienced in designing signal processing functions with CMOS, TTL, ECL families, development of detail circuit designs from conceptual block diagram requirements. Particular applications to PSK, QPSK, Satellite Modems, TDMA, Direct Spread Spectrum, Frequency Hop Spread Spectrum Modulation Techniques. (MSEE preferred)

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Detail design background primarily with digital systems. Must be capable of contributing to IR&D and proposal activities, perform conceptual design, analysis and costing on digital communication systems. A background in microprocessor based systems, busing technology and firmware/software development is desirable.

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Requires experience in analysis and design of RF systems and subsystems. Detailed knowledge of transmitter and receiver subsystems, analog signal processing and adaptive antenna techniques. (BSEE or MSEE)

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Requires the ability to analyze and determine customer requirements and lead development efforts for large communications systems. Requires familiarity with C31, WWMCCS, satellite and terrestrial communication, spread spectrum techniques and communication protocols. (MSEE or PhD)

Send resume with salary history to: Raeburn Josey, Professional Staffing, Harris Corporation, Government Communication Systems Division, P.O. Box 37, Melbourne, Florida 32901.

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Mr. Rod Gay,
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We are seeking senior level systems designers to participate in activities such as: new product definition, top level architectural design and detail design review.

Qualified individual will possess a technical degree plus a minimum of 8 yrs. experience with emphasis on design and development of on line banking systems within a major financial institution, systems supplier or equipment vendor company. Specific experience should be in the following areas.

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- **Communications Network Protocols**
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Send a resume including three current references to Dr. James Murtha, Marietta College, Marietta, Ohio 45750 or phone (614) 373-4643 ext. 280. Position may be filled immediately. Salary open, depending upon qualifications. An equal opportunity, affirmative action employer.

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International Division

Levi Strauss & Co., a leader in the apparel industry, is currently seeking Senior Analyst Programmers for our International Division located in San Francisco. These positions will relocate to Europe in late 1980.

For one position (P-44), you will perform analysis and design and test program logic, code programs, and prepare them for computer operation in support of Levi Strauss International business needs. You will also prepare required flowcharts and code routines to process data, assist Systems Designer in establishing file requirements and processing specifications, and test the operation of completed programs. For this position, we require a degree in business administration or equivalent work experience plus 4 years' experience in data processing, with specialty in systems analysis and programming. Graduate education in Computer Science is preferred, as well as demonstrated written and oral skills.

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Resumes including salary history should be directed in advance to Barbara Hailey, BTI COMPUTER SYSTEMS, INC., 870 W. Maude Ave., Sunnyvale, CA 94086. For information concerning interview schedules, please call COLLECT 408/733-1122, Ext. 240. If New York interviews inconvenient, please send resume indicating interest in a Sunnyvale interview. An equal opportunity employer.

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jr. analyst

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Send resumes and salary history to William H. Daughtrey, Jr., Durrill, Daughtrey & Associates, Inc., Suite 591, 830 E. Main Street, Richmond, Virginia 23219.

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- Texas Instruments 990 COBOL/BASIC
- BASIC Four

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Request for Proposal No. 458 due Thursday, June 7, 1979, for the rental, purchase, lease or lease purchase of printing, interpreting keypunch-verifiers. This RFP will be used to select keypunch equipment for the state of Mississippi through December, 1979.
Request for Proposal No. 459 due Thursday, June 7, 1979, for the acquisition of a cardless, multiprogramming computer system capable of running high level programming languages to be used at a small university; and, for the sale of an existing IBM System 3/10 computer system.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

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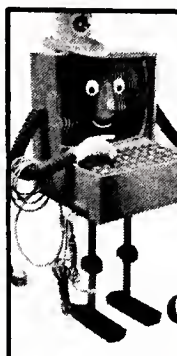

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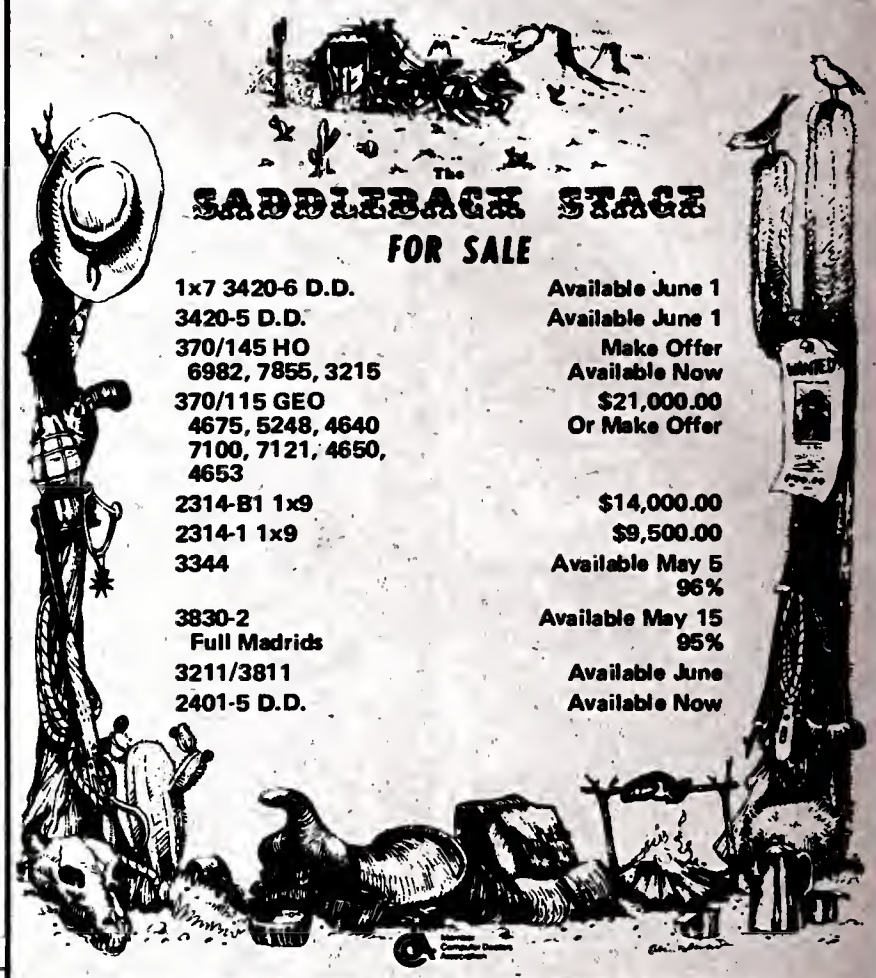

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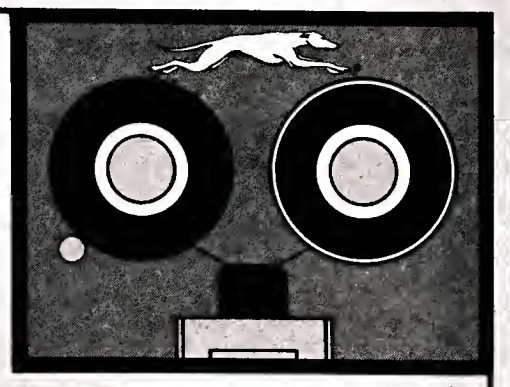

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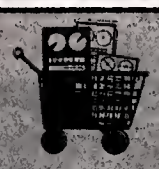

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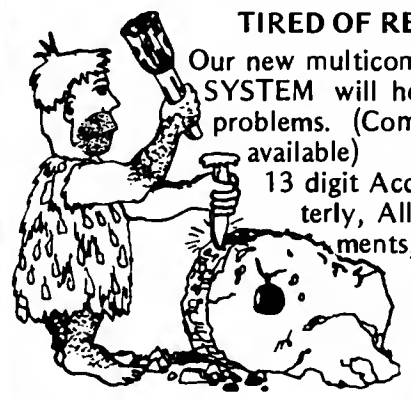

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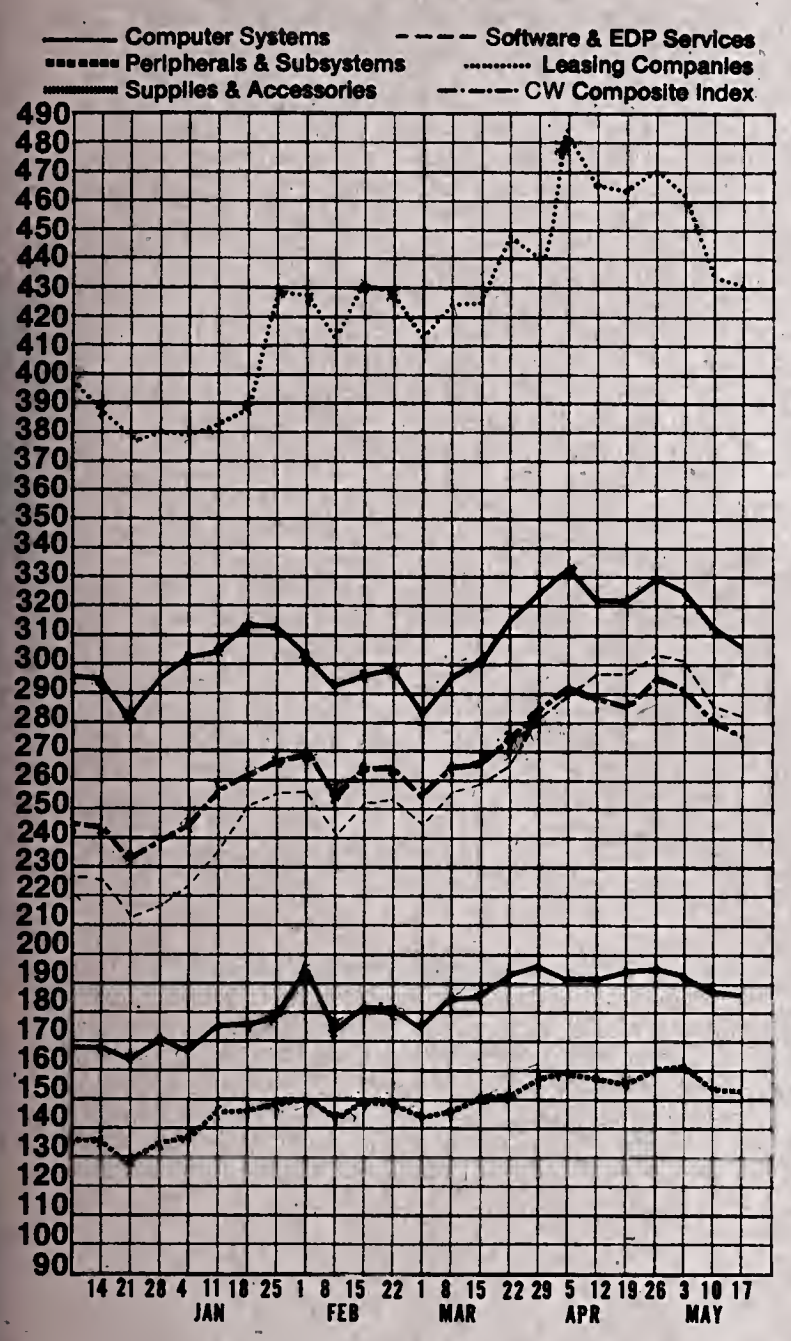

Earnings Reports

INFOREX
Three Months Ended March 31

	1979	e1978
Shr Ernd	$.19	$.17
Revenue	18,473,000	15,877,000
Tax Cred	109,000	57,000
Earnings	838,000	509,000

e-Resteted to reflect change in accounting for leases.

COMPUCORP
Yeer Ended Dec. 31

	1978	1977
Shr Ernd	....	$.23
Revenue	$3,819,000	2,329,000
Tex Cred	....	94,000
Earnings	(139,000)	223,000

DATA DIMENSIONS
Three Months Ended March 31

	1979	1978
Shr Ernd	....	$.19
Revenue	$3,320,000	3,574,000
Eernings	(516,000)	148,000

ELECTRONIC DATA SYSTEMS
Three Months Ended March 31

	1979	1978
Shr Ernd	$.48	$.39
Revenue	88,334,000	56,964,000
Earnings	6,038,000	4,936,000
9 Mo Shr	1.33	1.10
Revenue	192,764,000	158,063,000
Earnings	17,217,000	13,992,000

SCI SYSTEMS
Three Months Ended April 1

	1979	1978
Shr Ernd	$.22	a$.16
Revenue	8,851,985	6,155,457
Eernings	388,960	227,898
9 Mo Shr	.58	a.43
Revenue	26,420,902	17,909,387
Earnings	949,825	618,923

e-Adjusted to reflect a 7-for-5 stock split peid in August 1978.

TELEFILE COMPUTER
Three Months Ended Dec. 31

	a1978	1979
Revenue	$3,322,324	$2,508,186
Loss	311,671	126,365

e-Revised by company.

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEONESOAY, MAY 16, 1979

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

EXCH		1978-79 RANGE (1)	CLOSE MAY 16 1979	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
A	AMOAHL CORP	28- 69	39 1/2	- 1/2	-1.2
N	BURROUGHS CORP	59- 87	68 3/8	- 5/8	-0.9
O	COMPUTER AUTOMATION	15- 44	17	- 3/4	-4.2
N	CONTROL OATA CORP	23- 44	35 3/8	+ 3/4	+2.1
C	CRAY RESEARCH INC	8- 33	30 1/2	+1 1/2	+5.1
N	OATA GENERAL CORP	42- 73	67 3/8	- 3/4	-1.1
N	OATAPOINT CORP	34- 82	75 1/4	+ 1/4	+0.3
N	OIGITAL EQUIPMENT	39- 58	53	-1 3/4	-3.1
N	ELECTRONIC ASSOC.	2- 13	5 5/8	- 1/4	-4.2
A	ELECTRONIC ENGINEER.	9- 19	11 3/4	- 1/4	-2.0
N	FOUR-PHASE SYSTEMS	19- 46	33 5/8	0	0.0
N	FOXBORO	28- 40	36 5/8	+ 1/2	+1.3
O	GENERAL AUTOMATION	7- 26	15 3/4	- 1/4	-1.5
C	GRI COMPUTER CORP	1- 3	1 1/2	- 1/8	-7.6
N	HEWLETT-PACKARO CO	62- 96	89 3/4	- 3/8	-0.4
N	HONEYWELL INC	43- 76	68 1/8	+2 1/8	+3.2
N	IBM	236-321	306 3/4	-3	-0.9
G	MANAGEMENT ASSIST	9- 29	20 1/4	-1 7/8	-8.4
C	MANUFACTURING OATA S	9- 25	22 1/8	-1 1/8	-4.8
C	MICROOATA CORP	10- 23	19 3/8	0	0.0
C	MINI-COMPUTER SYST	4- 8	4 1/4	0	0.0
C	MOOULAR COMPUTER SYS	7- 18	13 1/8	-1	-7.0
N	NCR	37- 72	68 1/4	-1 3/4	-2.5
N	PRIME COMPUTER INC	20- 43	34 3/8	-1	-2.8
N	PERKIN-ELMER	17- 34	27 3/4	-1 3/4	-5.9
N	SPERRY RAND	33- 51	45 7/8	- 5/8	-1.3
A	SYSTEMS ENG. LABS	11- 24	13 1/2	- 5/8	-4.4
G	TANDEM COMPUTERS INC	13- 37	31	+1 3/4	+5.9
A	WANG LABS.	12- 43	35 3/8	-1 5/8	-4.3
	LEASING COMPANIES				
C	BOOTHE COURIER CORP	13- 21	17	0	0.0
C	COMDISCO INC	3- 21	19	0	0.0
A	COMMERCE GROUP CORP	1- 1	1/2	0	0.0
A	COMPUTER INVSTRS GRP	1- 7	3 3/8	- 1/8	-3.5
C	CONTINENTAL INFO SYS	5- 15	6 1/4	- 1/4	-3.8
M	OATRONIC RENTAL	1- 4	3 3/8	+ 1/8	+3.8
A	OCL INC	3- 5	4 7/8	+ 7/8	+21.8
N	OPF INC	8- 14	10 1/4	+ 1/4	+2.5
N	ITEL	14- 36	13 3/4	-3 1/2	-20.2
N	LEASCO CORP	24- 43	36 7/8	- 1/8	-0.3
O	LEASPAC CORP	1- 4	7/8	0	0.0
A	PIONEER TEX CORP	3- 7	3 1/4	- 1/8	-3.7
N	U.S. LEASING	13- 20	14	-1 1/2	-9.6

EXCH		1978-79 RANGE (1)	CLOSE MAY 16 1979	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	1 1/8	- 1/8	-10.0
O	ANACOMP INC	8- 22	14 5/8	- 7/8	-5.6
A	APPLIED OATA RES.	8- 17	8 5/8	0	0.0
N	AUTOMATIC OATA PROC	24- 36	31	-1	-3.1
C	COMPU-SERV NETWORK	5- 15	15	+1 1/4	+9.0
C	COMPUTER HORIZONS	1- 9	5 1/2	0	0.0
C	COMPUTER NETWORK	5- 16	6 5/8	0	0.0
N	COMPUTER SCIENCES	8- 17	10 7/8	- 1/4	-2.2
O	COMPUTER TASK GROUP	1- 7	6 3/4	+ 1/4	+3.8
O	COMPUTER USAGE	2- 4	2 3/8	+ 1/8	+5.5
C	COMPUT AUTO REP SVC	4- 10	7 1/2	- 1/8	-1.6
C	COMSHARE	6- 26	22	-2	-8.3
O	CULLINANE CORP	14- 33	19 1/4	- 1/2	-2.5
O	OATA OIMENSIONS INC	3- 9	3	- 3/8	-11.1
O	OATATAB	1- 4	2 1/2	- 1/8	-4.7
N	ELECTRONIC OATA SYS.	15- 25	20	- 1/8	-0.6
O	INSYTE CORP	1- 3	1 1/8	0	0.0
C	IPS COMPUTER MARKET.	2- 3	3	0	0.0
O	KEANE ASSOCIATES	3- 6	5	- 1/4	-4.7
C	KEYOATA CORP	1- 4	3 1/4	- 1/4	-7.1
A	LOGICON	10- 19	11 7/8	- 1/4	-2.0
A	NATIONAL CSS INC	15- 48	47 3/4	+ 1/8	+0.2
O	NATIONAL OATA CORP	7- 13	10 7/8	- 1/4	-2.2
A	ON LINE SYSTEMS INC	12- 30	19 7/8	0	0.0
N	PLANNING RESEARCH	4- 10	5 5/8	- 1/4	-4.2
C	PROGRAMMING & SYS	1- 1	1 1/2	0	0.0
O	RAPIOATA INC	3- 7	7 1/8	+1 1/8	+18.7
O	REYNOLDS & REYNOLO	18- 36	29 1/4	-1	-3.3
O	SCIENTIFIC COMPUTERS	3- 9	6 7/8	0	0.0
N	TYMSHARE INC	18- 41	39 1/4	+1 5/8	+4.3
A	URS SYSTEMS	5- 8	5 1/2	- 1/4	-4.3
N	WYLY CORP	1- 7	5 5/8	- 5/8	-10.0
	PERIPHERALS & SUBSYSTEMS				
N	ADORESSOGRAPH-MULT	14- 32	14 1/2	- 1/4	-1.6
N	AMPEX CORP	10- 19	14 7/8	-1 1/8	-7.0
O	ANOERSON JACOBSON	5- 10	7 1/2	0	0.0
N	APPLIED DIG OATA SYS	8- 22	8 1/4	- 3/8	-4.3
C	BEEHIVE INT'L	3- 7	4 1/4	- 3/8	-8.1
A	BOLT,BERANEK & NEW	6- 14	12 3/4	+ 5/8	+5.1
N	BUNKER-RAMO	10- 25	25 3/8	+1 5/8	+6.8
A	CALCOMP	3- 13	12 1/4	+3 3/4	+44.1
O	CAMBRIOGE MEMORIES	3- 9	2 3/4	- 1/4	-8.3
N	CENTRONICS OATA COMP	16- 46	44 5/8	+ 5/8	+1.4
C	COGNITRONICS	1- 4	2 1/4	- 1/8	-5.2
C	COMPUTER COMMUN.	6- 10	7 7/8	+ 1/8	+1.6
O	COMPUTER CONSOLES	4- 12	12	+ 1/2	+4.3
A	COMPUTER EQUIPMENT	3- 6	4 1/2	0	0.0
C	COMPUTER TRANSCEIVER	1- 5	3	+ 1/4	+9.0
G	COMPUTERVISION CORP	9- 55	54 1/2	+1 1/8	+2.1
E	COMTEN	9- 38	24 1/2	0	0.0
N	CONRAC CORP	13- 26	13 5/8	-1 1/8	-7.6

EXCH		1978-79 RANGE (1)	CLOSE MAY 16 1979	WEEK NET CHNGE	WEEK PCT CHNGE
O	OATA ACCESS SYSTEMS	3- 14	8	0	0.0
A	OATA PROOUCTS CORP	14- 25	14 5/8	-2 5/8	-15.2
O	OATUM INC	2- 6	2 1/2	+ 1/4	+11.1
O	OECISION OATA COMPUT	2- 6	3 5/8	- 3/8	-9.3
O	OELTA OATA SYSTEMS	1- 1	3/8	0	0.0
A	OOCUMATION INC	6- 34	22 1/2	- 1/2	-2.1
O	OATARAM CORP	6- 32	16	0	0.0
N	ELECTRONIC M & M	4- 9	3 3/4	0	0.0
O	FABRI-TEK	1- 2	3/4	-	-7.7
O	GENERAL COMPUTER SYS	1- 3	2	0	0.0
O	GENERAL OATACOMM INO	9- 21	16 1/4	+1	+6.5
N	HAZELTINE CORP	10- 17	14 7/8	- 3/8	-2.4
N	HARRIS CORP	17- 36	27 3/8	- 1/4	-0.9
O	INFOREX INC	6- 11	7 1/4	- 1/8	-1.6
C	INFORMATION INTL INC	7- 12	9 1/4	- 1/2	-5.1
O	INFOTON	1- 3	2 3/4	0	0.0
O	INTEL CORP	26- 48	44	-1	-2.2
O	INTERSIL	7- 18	13 1/8	- 5/8	-4.5
A	LUNOY ELECTRONICS	4- 8	6 3/4	- 1/2	-6.8
O	MSI OATA CORP	10- 19	10 1/8	- 1/4	-2.4
N	MEMOREX	27- 59	32 1/2	-1 1/2	-4.4
N	MOHAWK OATA SCI	6- 15	10 1/4	- 5/8	-5.7
O	OMEX	2- 8	6 1/2	- 1/2	-7.1
O	PARADYNE CORP	9- 18	15	+ 1/4	+1.6
C	PENRIL CORP	5- 12	9 1/8	-1 1/8	-10.9
N	PERTEC CORP	8- 17	8 3/8	- 1/4	-2.8
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
E	RECOGNITION EQUIP	7- 13	6 7/8	-1 1/8	-14.0
O	SCAN OATA	1- 5	2 5/8	0	0.0
N	STORAGE TECHNOLOGY	19- 46	39 3/8	+ 3/8	+0.9
O	T BAR INC	11- 22	17	- 1/4	-1.4
C	TALLY CORP.	4- 14	12	0	0.0
A	TEC INC	6- 13	7	- 1/8	-1.7
N	TEKTRONIX INC	33- 57	47	-4 3/4	-9.1
N	TELEX	3- 9	4 5/8	- 1/4	-5.1
C	TESOATA SYSTEMS CP	9- 24	22 3/4	+1 3/4	+8.3
O	WILTEK INC	1- 2	5/8	0	0.0
	SUPPLIES & ACCESSORIES				
A	AMERICAN BUS PROOS	6- 11	9 7/8	0	0.0
O	BALTIMORE BUS FORMS	1- 4	1	0	0.0
N	BARRY WRIGHT	14- 34	15 3/4	+ 1/4	+1.6
O	CYBERMATICS INC	1- 1	3/4	0	0.0
O	OUPLEX PRODUCTS INC	13- 30	18 1/4	- 1/8	-0.6
N	ENNIS BUS. FORMS	8- 19	19	+1	+5.5
N	3M COMPANY	43- 66	54 7/8	+ 3/8	+0.6
C	MOORE CORP LTO	26- 34	32	- 1/2	-1.5
N	NASHUA CORP	18- 37	21 1/2	- 5/8	-2.8
C	STANDARO REGISTER	20- 27	25 1/4	+ 1/4	+1.0
A	T&B PRODUCTS CO	8- 16	13	- 1/4	-1.8
A	WABASH MAGNETICS	10- 22	15 3/8	- 7/8	-5.3
N	WALLACE BUS FORMS	18- 33	23 1/4	- 3/4	-3.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
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